OPMI® Sensera
on S7 Suspension Systems

Instructions for use

ZEISS

Key to symbols

Different symbols used in this manual draw your attention to safety aspects and useful tips. These symbols are explained in the following.

Warning!
The **warning triangle** indicates potential sources of danger which may constitute a risk of injury for the user or a health hazard.

Caution:
The **square** indicates situations which may lead to malfunction, defects, collision or damage of the instrument.

Note:
The **hand** indicates hints on the use of the instruments or other tips for the user.

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S7 ceiling mount with lifting column

Safety

The device described in this manual has been designed and tested in accordance with Carl Zeiss safety standards as well as German and international standards. This guarantees a high degree of instrument safety.

The system described in this user manual has been designed in compliance with the requirements of:

– EN   – IEC   – UL   – CSA

In accordance with Directive 93/42/EEC for medical devices, the complete quality management system of the company Carl Zeiss Surgical GmbH, 73446 Oberkochen, Germany, has been certified by DQS Deutsche Gesellschaft zur Zertifizierung von Managementsystemen GmbH, a notified body, under registration number 250758 MP23.

– As per Directive 93/42/EEC, the unit is a Class I instrument.

– For USA: FDA classification Class I.

We would like to provide you with information about safety aspects which must be observed when handling this device. This chapter contains a summary of the most important information concerning matters relevant to instrument safety.

Important safety information has been incorporated in this manual and is marked with a warning triangle accordingly. Please give this information your special attention.

The correct use of the system is absolutely vital for safe operation. Please make yourself totally familiar with the contents of this manual prior to start-up of the instrument. Please also observe the user manuals of any additional equipment. Further information is available from our service department or from authorized representatives.

• Please observe all applicable accident prevention regulations.

• The instrument must be connected to a special emergency backup line supply in accordance with the regulations or directives which apply in your country.

Notes on installation and use

Safe working order

- Do not operate the equipment contained in the delivery package in

  – explosion-risk areas,

  – the presence of inflammable anesthetics or volatile solvents such as alcohol, benzine or similar chemicals.

- Do not station or use the instrument in damp rooms. Do not expose the instrument to water splashes, dripping water or sprayed water.

- Immediately unplug any equipment that gives off smoke, sparks or strange noises. Do not use the instrument until our service representative has repaired it.

- Do not place any fluid-filled containers on top of the instrument. Make sure that no fluids can seep into the instrument.

- Do not force cable connections. If the male and female parts do not readily connect, make sure that they are appropriate for one another. If any of the connectors are damaged, have our service representative repair them.

- Potential equalization: If requested, the instrument can be incorporated into potential equalization measures.

- Do not use a mobile phone in the vicinity of the equipment because the radio interference can cause the equipment to malfunction. The effects of radio interference on medical equipment depend on a number of various factors and are therefore entirely unforeseeable.

- Modifications and repairs on these instruments or instruments used with them may only be performed by our service representative or by other authorized persons.

- The manufacturer will not accept any liability for damage caused by unauthorized persons tampering with the instrument; this will also forfeit any rights to claim under warranty.

- Over longer distances (e.g. removal, return for repair, etc), the instrument may only be transported in the original packaging or in special return packaging. Please contact your dealer or the Carl Zeiss service team.

- Use this instrument only for the applications described.

- Only use the instrument with the accessories supplied. Should you wish to use other accessory equipment, make sure that Carl Zeiss or the equipment manufacturer has certified that its use will not impair the safety of instrument.

- Only personnel who have undergone training and instruction are allowed to use this instrument. It is the responsibility of the customer or institution operating the equipment to train and instruct all staff using the equipment.

- Keep the user's manuals where they are easily accessible at all times for the persons operating the instrument.

- Never look at the sun through the binocular tube, the objective lens or an eyepiece.

- Do not pull at the light guide cable, at the power cord or at other cable connections.

- This instrument is a high-grade technological product. To ensure optimum performance and safe working order of the instrument, its safety must be checked once every 12 months. We recommend having this check performed by our service representative as part of regular maintenance work.
  If a failure occurs which you cannot correct using the trouble-shooting table, attach a sign to the instrument stating it is out of order and contact our service representative.

Warning!
Do not use the video images for diagnostic purposes, as the video cameras and the monitor have not been calibrated. The visualized images may therefore include deviations in shape, contrast and color.

- Observe the labels showing the symbol "Risk of crushing"!

Notes on EMC (Electromagnetic Compatibility)

The device complies with the EMC requirements of IEC 60601-1-2. For operating the device, observe the EMC precautions specified below.

Only use spare parts approved by Carl Zeiss for this device.

Do not use any portable or mobile HF communication equipment in the vicinity of the device, as it cannot be ruled out that the function of the device will be impaired.

Requirements for operation

• For ceiling mounts only: Our service staff or a qualified person appointed by us will install the system on ceiling anchors which have been properly mounted by the construction engineers responsible. These ceiling anchors must comply with the specifications contained in our planning manual.

Our service representative or a specialist authorized by us will install the instrument. Please make sure that the following requirements for operation remain fulfilled in the future:

– All mechanical connections (details in the user's manual) which are relevant to safety are properly connected and screw connections tightened.

– All cables and plugs are in good working condition.

– The voltage setting on the instrument conforms to the rated voltage of the line supply on site.

– The instrument is plugged into a power outlet which has a properly connected protective ground contact.

– The power cord being used is the one designed for use with this instrument.

Before every use and after re-equipping the instrument

• Make sure that all "Requirements for operation" are fulfilled.

• Go through the checklist.

• Re-attach or close any covers, panels or caps which have been removed or opened.

• Pay special attention to warning symbols on the instrument (triangular warning signs with exclamation marks), labels and any parts such as screws or surfaces painted red.

• Do not cover any ventilation openings.

For every use of the instrument

General
• Never operate the system unattended.

• Avoid looking directly into the light source, e.g. into the microscope objective lens or a light guide.

• When the illumination is on, the light guide must be connected at both ends. Otherwise there is a risk of fire or burn injuries.

- Make sure that the instrument has been switched off before you change the xenon lamp module. When switched on, the ignition system generates high voltage.

- The xenon illumination system is a high-intensity light source which - if used improperly - can cause thermal injury to skin or tissue. Keep the exposed tissue moist and provide sufficient irrigation. Carefully monitor the effects of the illumination on the tissue, in particular in the following cases:

  – during prolonged procedures on skin and tissue using objective lenses with a short focal length (short working distance),

  – during procedures on tissue with a low blood supply,

  – with high brightness settings of the xenon lamp.

- Since the xenon lamp provides high light intensity and generates light with a spectrum similar to daylight, it must not be used for ophthalmic applications.

- Any kind of radiation has a detrimental effect on biological tissue. This also applies to the light illuminating the surgical field. Please therefore reduce the brightness and duration of illumination on the surgical field to the absolute minimum required.

S7 floor stand
- Using the brake tabs on the base, secure the stand in position. Make sure that the stand is stable and cannot roll away.

S7 ceiling mount with lifting column
- The lifting column is used to move the microscope into position for surgery prior to the surgical procedure.
  Do not constantly move the lifting column up and down, since a thermal cut-out will then automatically switch off the drive motor. If this occurs, the lifting column cannot be moved again until the motor has cooled down.

After every use of the instrument

- Always use the main power switch of the instrument to turn it off.

- The main power switch must always be turned off when the instrument is not in use.

Safety devices of the suspension system
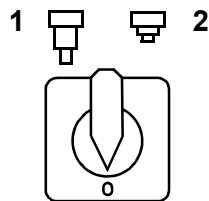
Lifting column

1 ⊟   ⊟ 2

Selector switch
for setting the optimum viewing height of the surgical microscope or for downward movement into the working position.
As long as you keep the selector switch in the turned position, the lifting column moves upward (2) or downward (1), depending on the switch position. When you release the selector switch, the lifting column stops immediately.
The switching technology causes a delay of approx. 2 seconds at the upper and lower end positions of the lifting column. After this time, you can move the column in the opposite direction again by activating the selector switch.

– Before raising or lowering the suspension system, make sure that there is sufficient clearance from other objects so that any collision is avoided.

Warning!
– Do not activate the lifting column during surgery!

– Do not use the lifting column for focusing.

– Make sure that the patient is not put at risk or injured by the motorized adjustment of the lifting column.

Halogen illumination system

1 Manual switching to the backup lamp
The lamp housing contains a backup lamp which is automatically swung into the illumination beam path when the first lamp fails. If this automatic function fails, you can switch on the backup lamp by pressing this button.

2 GG 475 retina protection filter
The filter selector knob has four positions:

0   no filter

1   GG 475 filter: to protect the patient's eye during treatment against unnecessary (blue) radiation (retinal injury).

2   KK 40 filter: to increase color temperature
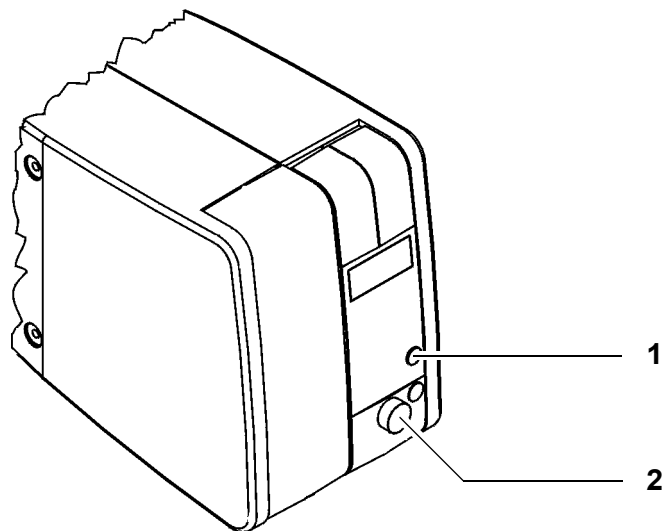
3   no filter

Xenon illumination system

⚠ **Warning!**
The xenon lamp has a limited service life of 500 h.

If used beyond its maximum service life, the xenon lamp may explode.

Change the xenon lamp in good time.

⚠ **Warning!**
Lamp rupture (audible as a loud bang) may lead to jamming of the lamp module and/or failure of the electronics modules.

• Before opening the lamp housing, make sure that the system is moved to a position where neither the patient nor the user is put at risk by falling items.

• Do not continue using the system if the lamp module is jammed or the illumination is no longer operational due to defective electronics modules. Inform our service department.
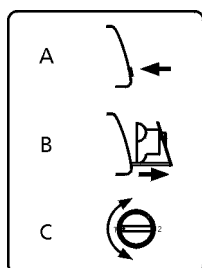
1 Switching to the backup lamp
The lamp module contains two xenon lamps. The second lamp is used as a backup lamp which has to be swung into the illumination beam path when the first lamp fails.
If the xenon lamp fails, open the lamp module as follows:
Press button (3). The lamp module is slightly ejected. Pull out the lamp module as far as it will go. Turn knob (1) through 180° until it snaps in. This moves the backup lamp into the illumination beam path. Push the lamp module all the way back into the lamp housing.

2 Indicator: backup lamp is in use
When the red segment in knob (1) lights up, the backup lamp is in use.

☞ Note:
If the first lamp has failed and the backup lamp is in use, make sure to have a backup lamp module ready at hand as a precaution.
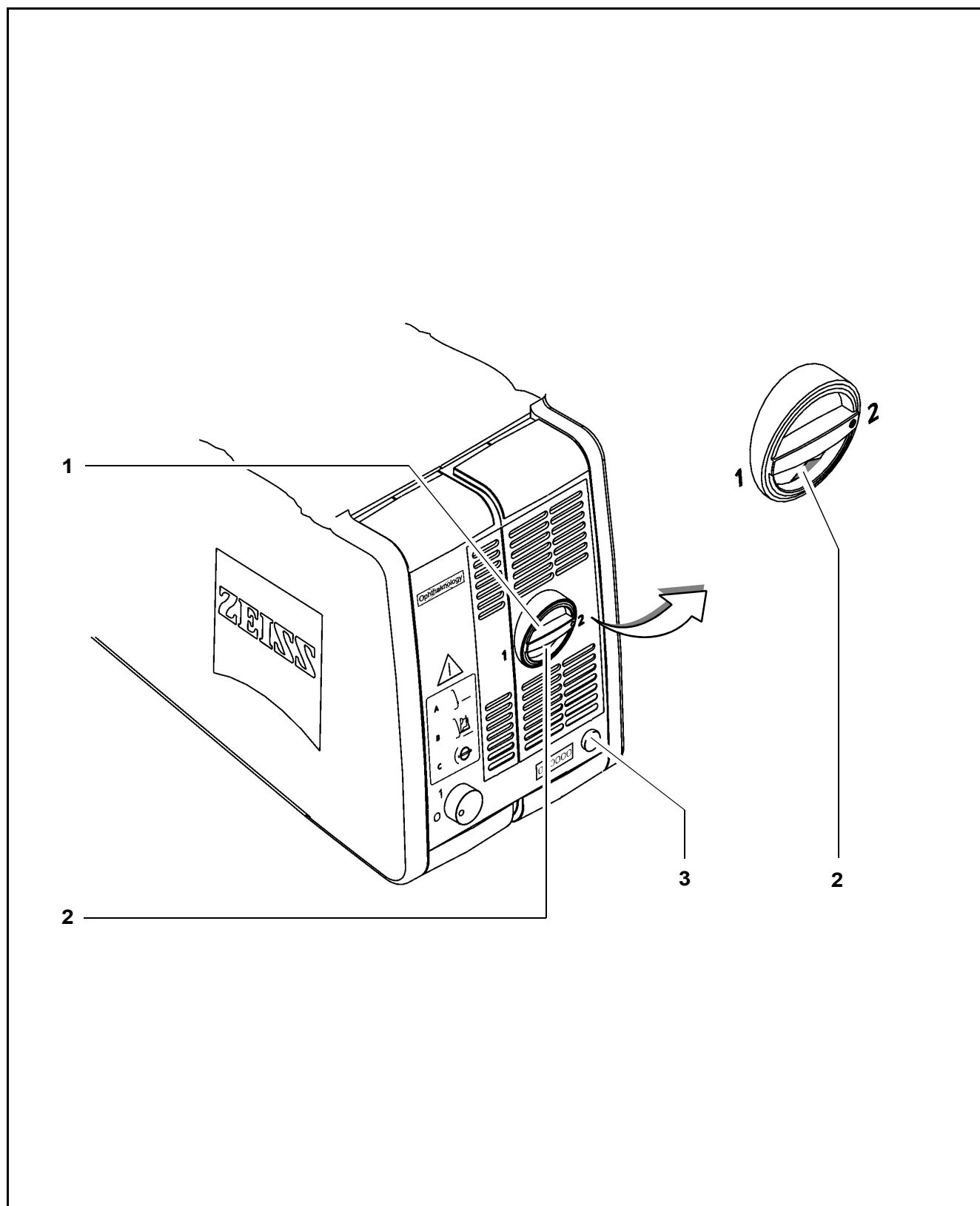
Warning labels and notes

⚠️ **Caution:**
Observe all warning labels and notes!
If any label is missing on your instrument or has become illegible, please contact us or one of our authorized representatives. We will supply the missing labels.

max 14 kg

Carl Zeiss

SIP Service Identification Program
SIP-No.

Carl Zeiss Surgical
GmbH
73446 Oberkochen, Germany
XXXXxxxxx

XXXXxxxxxx

000000-1339-046

- Balance +
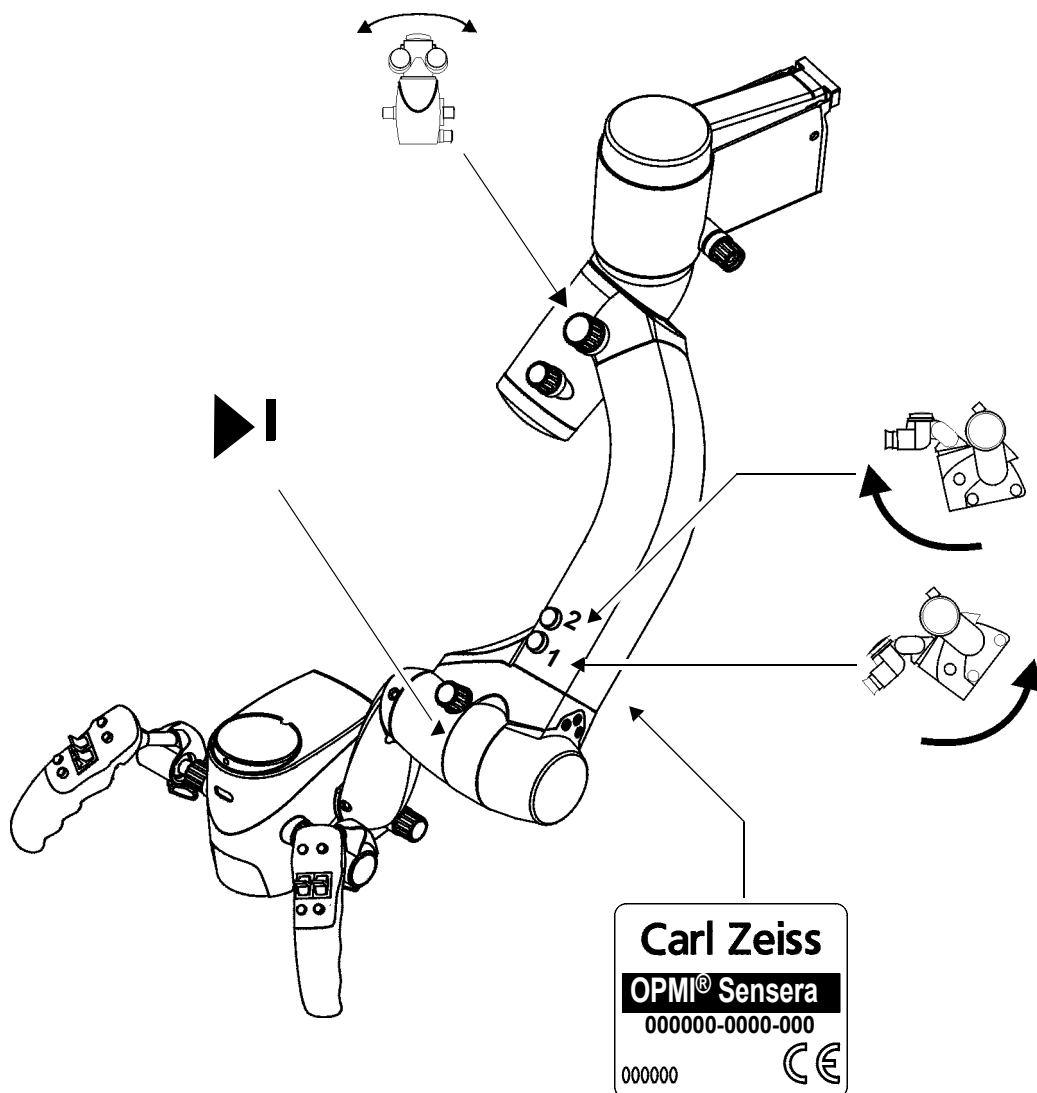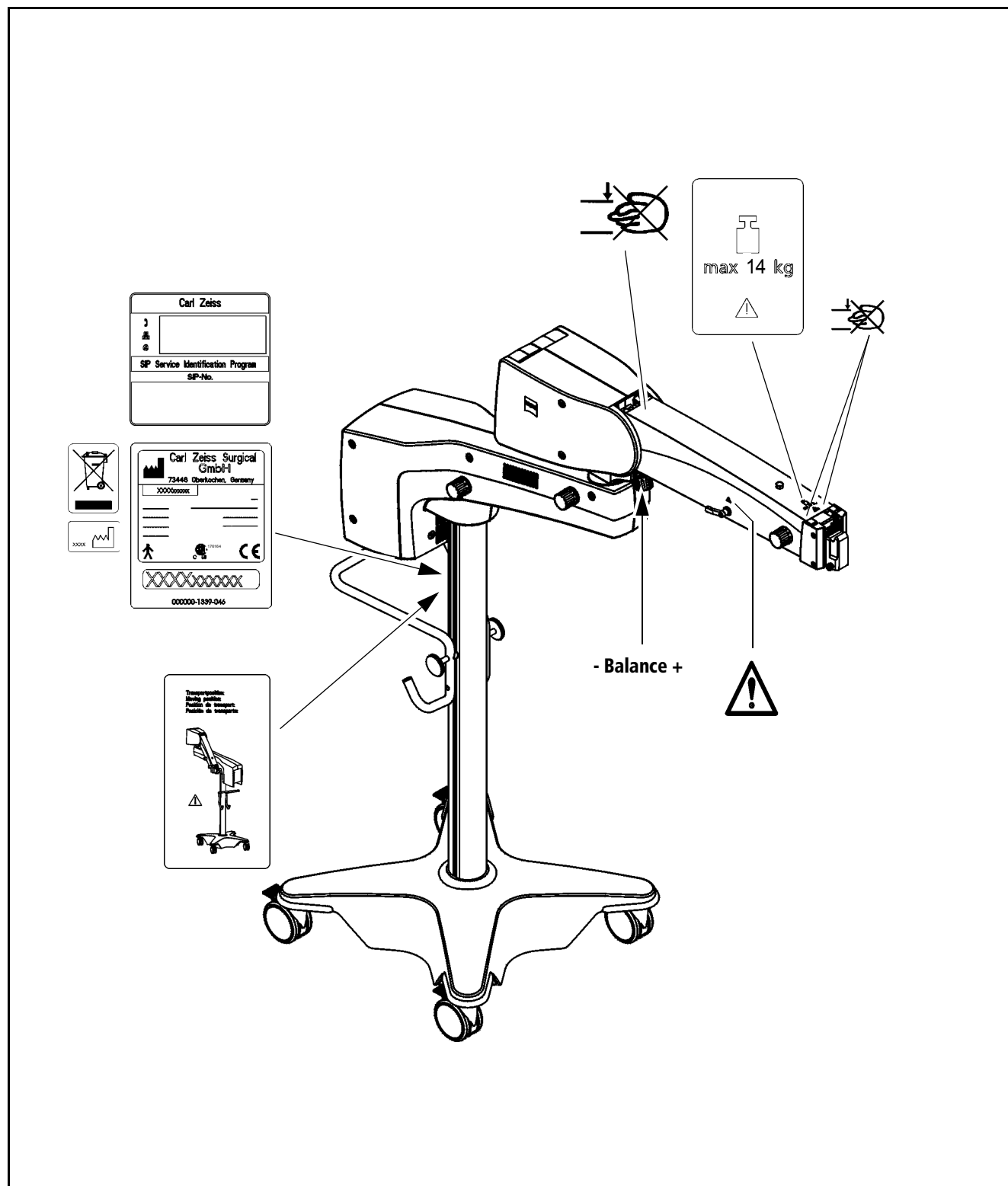
S7 floor stand with instrument tray option

max 14 kg

- Balance +

Carl Zeiss

SIP Service Identification Program
SIP-No.

Carl Zeiss Surgical
GmbH
73446 Oberkochen, Germany
XXXXxxxxxx

XXXXXxxxxxxx
000000-1339-046

- **Balance** +

max 14 kg
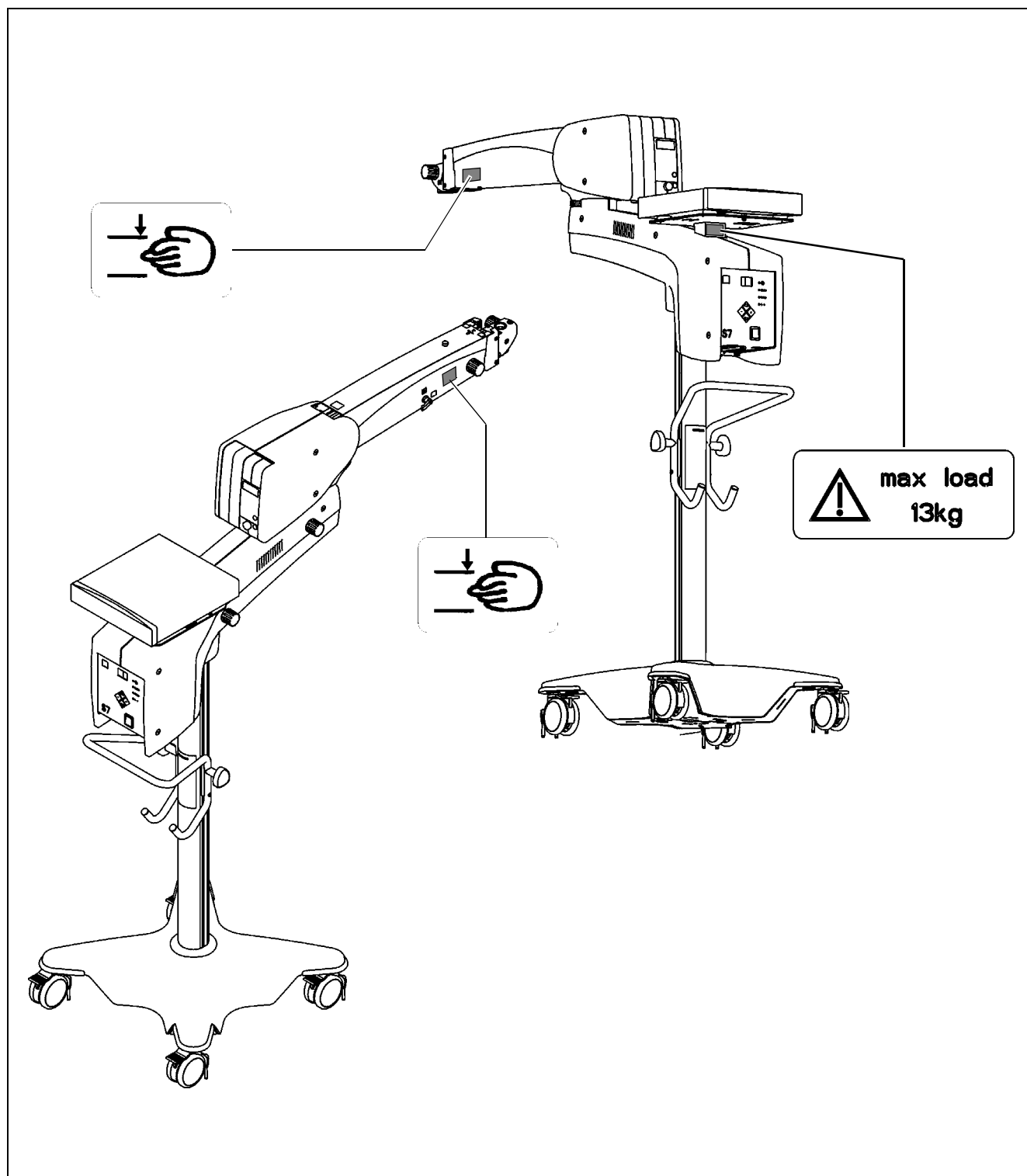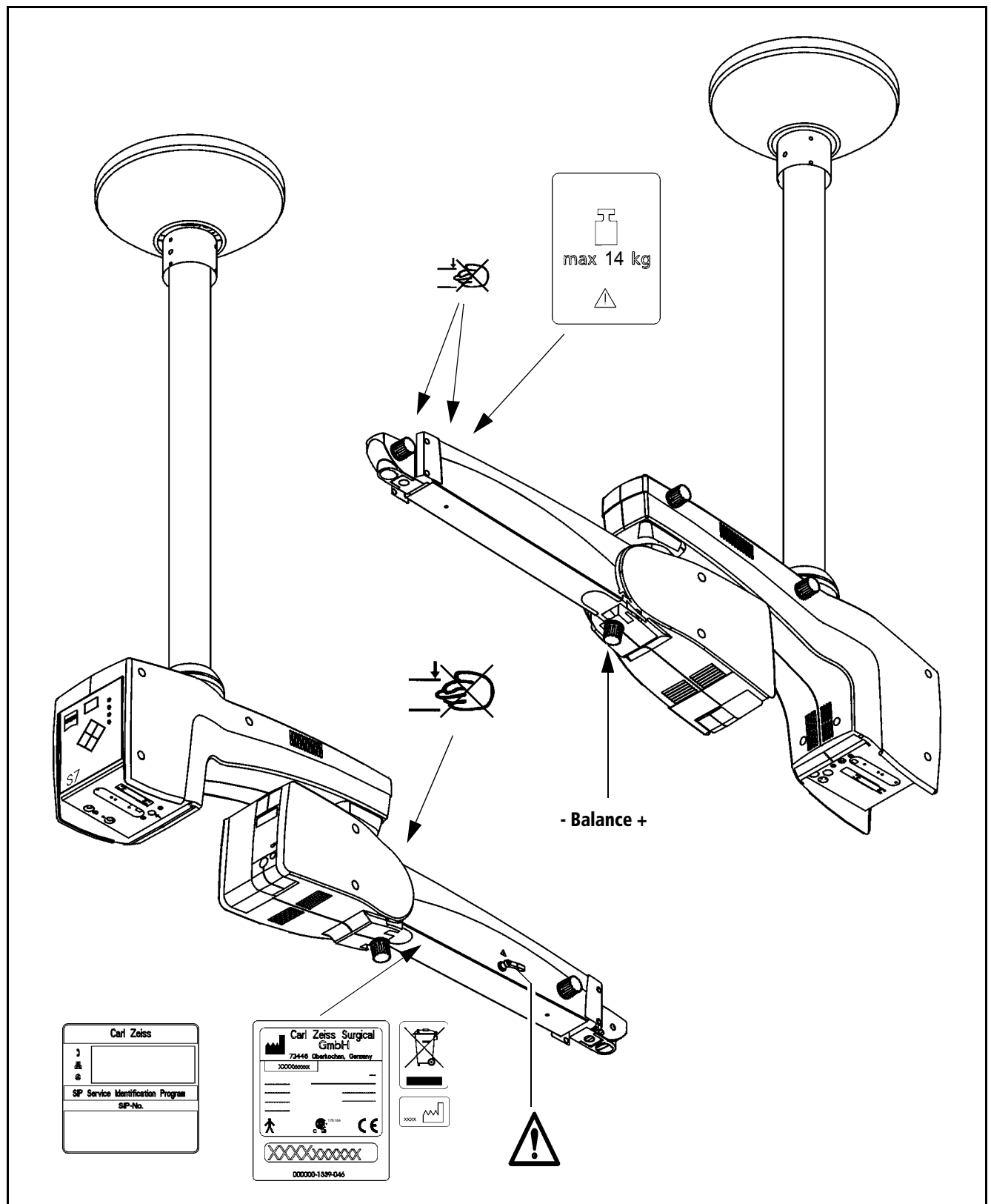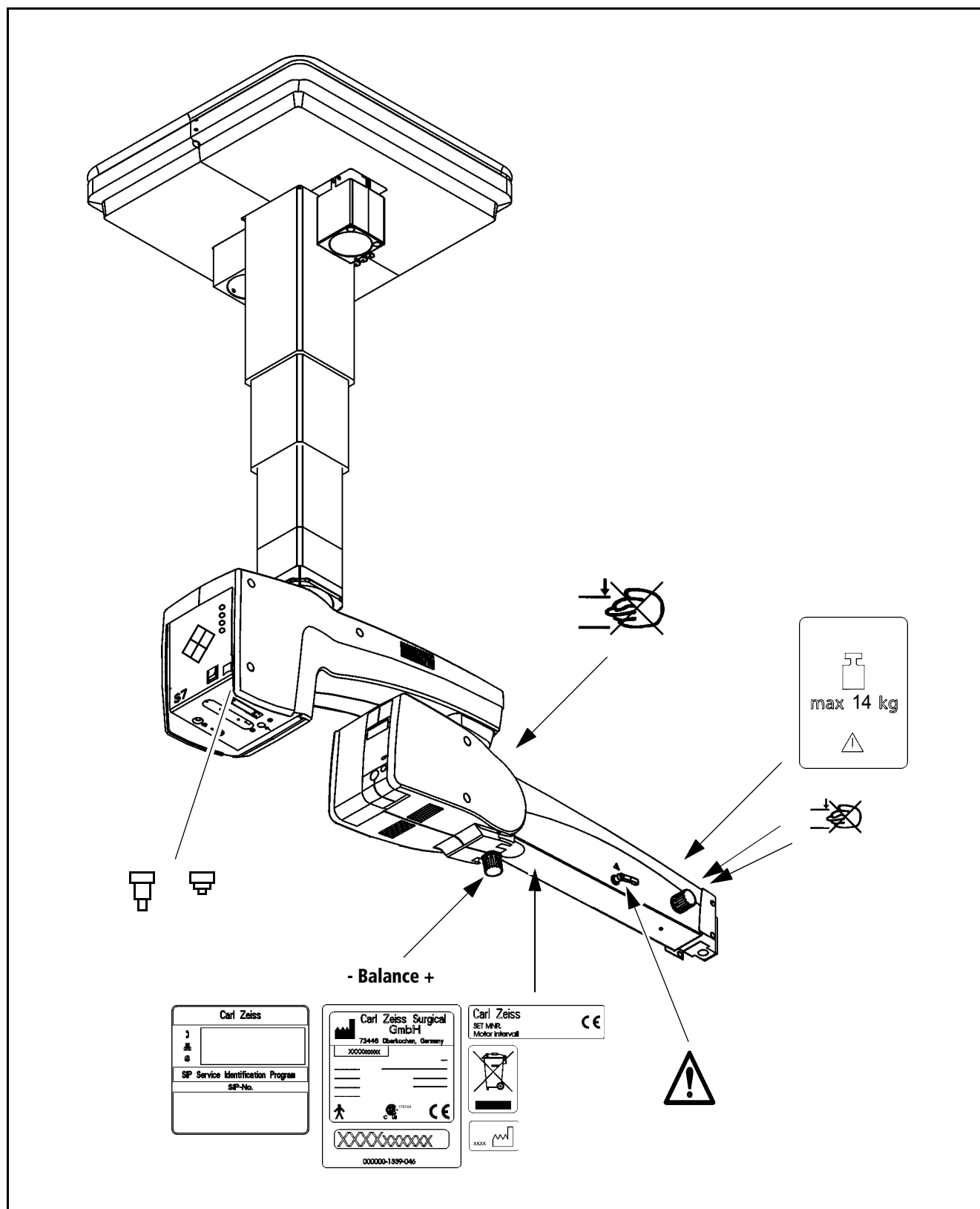
Description

Sensera surgical microscope on S7 suspension systems

Intended use

The OPMI Sensera surgical microscope on S7 suspension systems has been specially designed for use in ENT surgery, i.e. the overall system meets the special requirements of this discipline.

The system is intended for use in hospitals, clinics or other human medicine institutions.

The system must only be operated by physicians, nurses and other OR staff who have undergone appropriate training and observe the instructions of the user's manual. The installation conditions and the use of the system must meet microsurgical requirements:

– low vibration

– clean environment

– avoidance of extreme mechanical stress.

Description of the system

The apochromatic optics of the microscope provide superb optical quality. The microscope image displays optimum contrast and excellent detail recognition along with outstanding depth of field and maximum 3D perception. The 1:6 ratio zoom system allows the magnification of the overall system to be set as required by the surgical procedure.

You can use the surgical microscope with or without an integrated video camera. Depending on your requirements, you can choose between a PAL or an NTSC video system.

Suspension systems

The S7 floor stand is a suspension system for Zeiss surgical microscopes. It comprises a suspension arm, a carrier arm, a stand column and a stand base.
A maneuvering handle attached to the stand column is used to move the stand and to attach the foot control panel. The stand column is provided on its left and right with cable supports for winding up cables before the unit is relocated.

The stand base is extremely easy to move on its four casters. It has been designed in such a way that high stability is ensured even with unfavorable loading of the stand. The locking tabs permit you to reliably secure the floor stand in position at the site of use.

Note:
As the stand is very easy to maneuver, there is a tendency to underestimate its weight. Therefore, move the stand slowly and carefully!

The S7 ceiling mount with rigid column is a suspension system for Zeiss surgical microscopes. It comprises a suspension arm, a carrier arm, a ceiling column and a ceiling flange.

The S7 ceiling mount with lifting column is a suspension system for Zeiss surgical microscopes. It comprises a suspension arm, a carrier arm, a ceiling flange and a lifting column. This motorized lifting column permits the viewing height to be perfectly matched to the surgeon's requirements.

The carrier arm of all suspension systems contains the control unit with all electrical supply systems required for the control of a motorized surgical microscope. You can control the motorized functions using the handgrips, or via a foot control panel (option). A light guide (fiber optic illumination) directs the light from the lamp housing in the suspension system to the surgical microscope.

The suspension arm of all types of suspension system permits almost effortless positioning of the surgical microscope. The spring force of the suspension arm can be varied in a range from 6 to 14 kg, permitting reliable balancing of the microscope even with accessory equipment attached. The downward movement of the suspension arm can be limited using an adjustable positioning aid.

A control panel allows the adjustment of user-defined settings such as the zoom, focus, brightness and video settings, and the programming of the configurable handgrip buttons.

The SpeedFokus autofocus option permits you to select features (ROI, region of interest) in the image of the surgical field and to rapidly focus on them automatically or at the press of a button.

USB memory option
An optional USB port permits you to save image data in the JPEG or TIFF format on a USB memory stick. Image data can also be read from a USB memory stick and displayed on a connected monitor. The saved image data can also be deleted.

Warning!
If the xenon light source is used, the unit must not be used in ophthalmic applications. Severe injury to the patient's eye is possible.

System components

1 S7 ceiling mount with lifting column

2 S7 ceiling mount

3 S7 floor stand

4 OPMI Sensera surgical microscope
with 180° tiltable tube and magnetic eyepieces

Note:
The overall system comprises a suspension system and a micro-scope. All options described in this user manual can be ordered sep-arately.
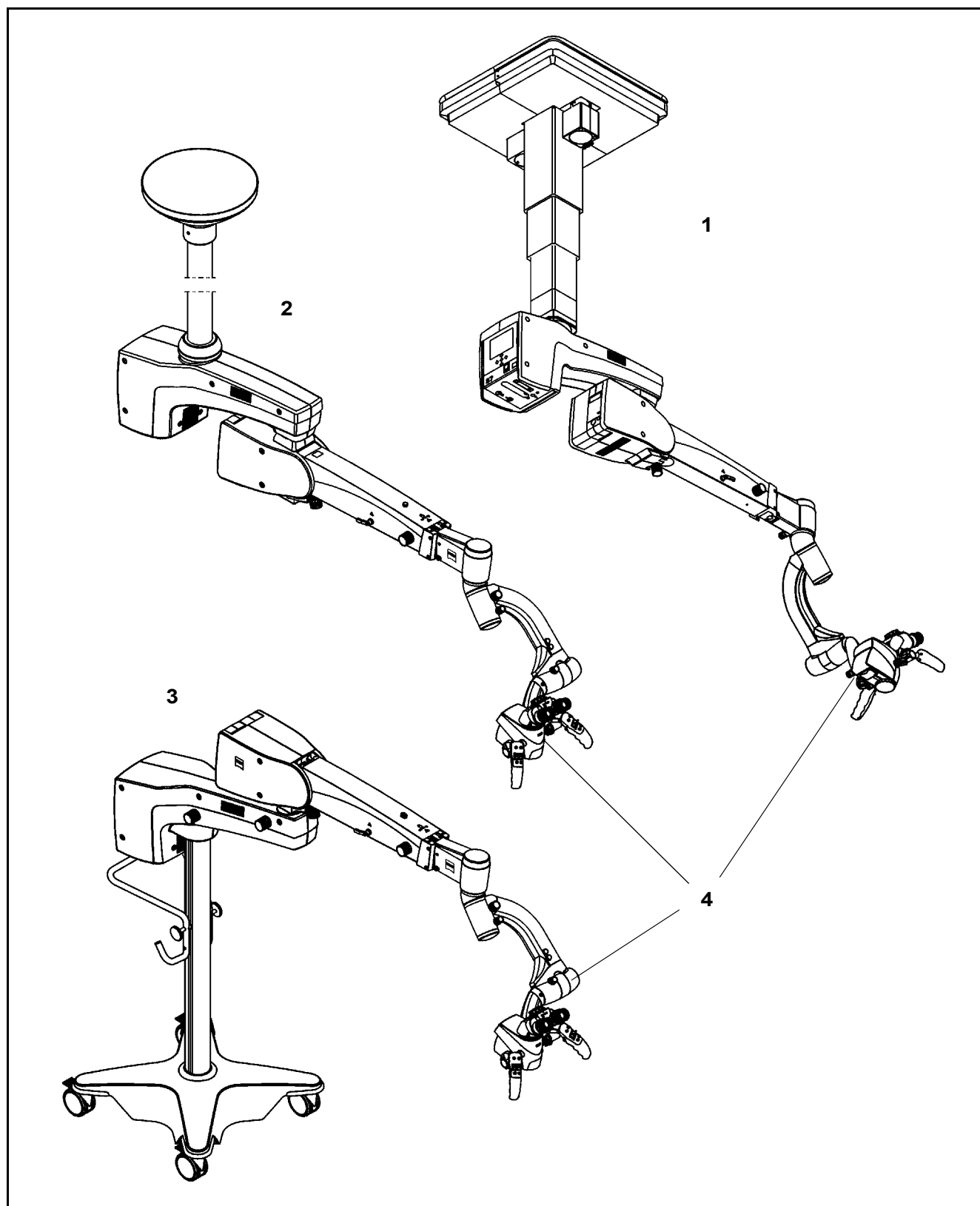
OPMI Sensera surgical microscope

Design

The Sensera surgical microscope comprises the following modules:

1 Microscope body
The apochromatic optics of the microscope provide superb optical quality. The microscope image displays optimum contrast and excellent detail recognition along with outstanding depth of field and maximum 3D perception. The 1:6 ratio zoom system allows the magnification of the overall system to be set as required by the surgical procedure. Using the integrated variable focusing optics (Varioskop), you can adjust the working distance between 200 mm and 415 mm as required.

2 Support arm for the surgical microscope

3 Balancing system
This system allows almost effortless balancing of the surgical microscope.

4 Axis of microscope rotation

5 Coupling
for mounting the surgical microscope on the suspension system.

6 Handgrips
for moving the surgical microscope. Using the buttons on the handgrips, you can control important functions (e.g. focusing, zooming, brightness, still/video camera release).

Warning!
To permit almost effortless guidance of the surgical microscope, the microscope and the suspension system used must be correctly balanced.
If the system is in an extremely unbalanced state, the unit can move uncontrollably out of position. For this reason, hold the surgical microscope tightly at its handgrips before loosening the friction adjustment screw (see page 52) on the suspension arm.

7 Motorized fine focusing (option),
recommended for the use of OPMI Sensera with laser micromanipulators.
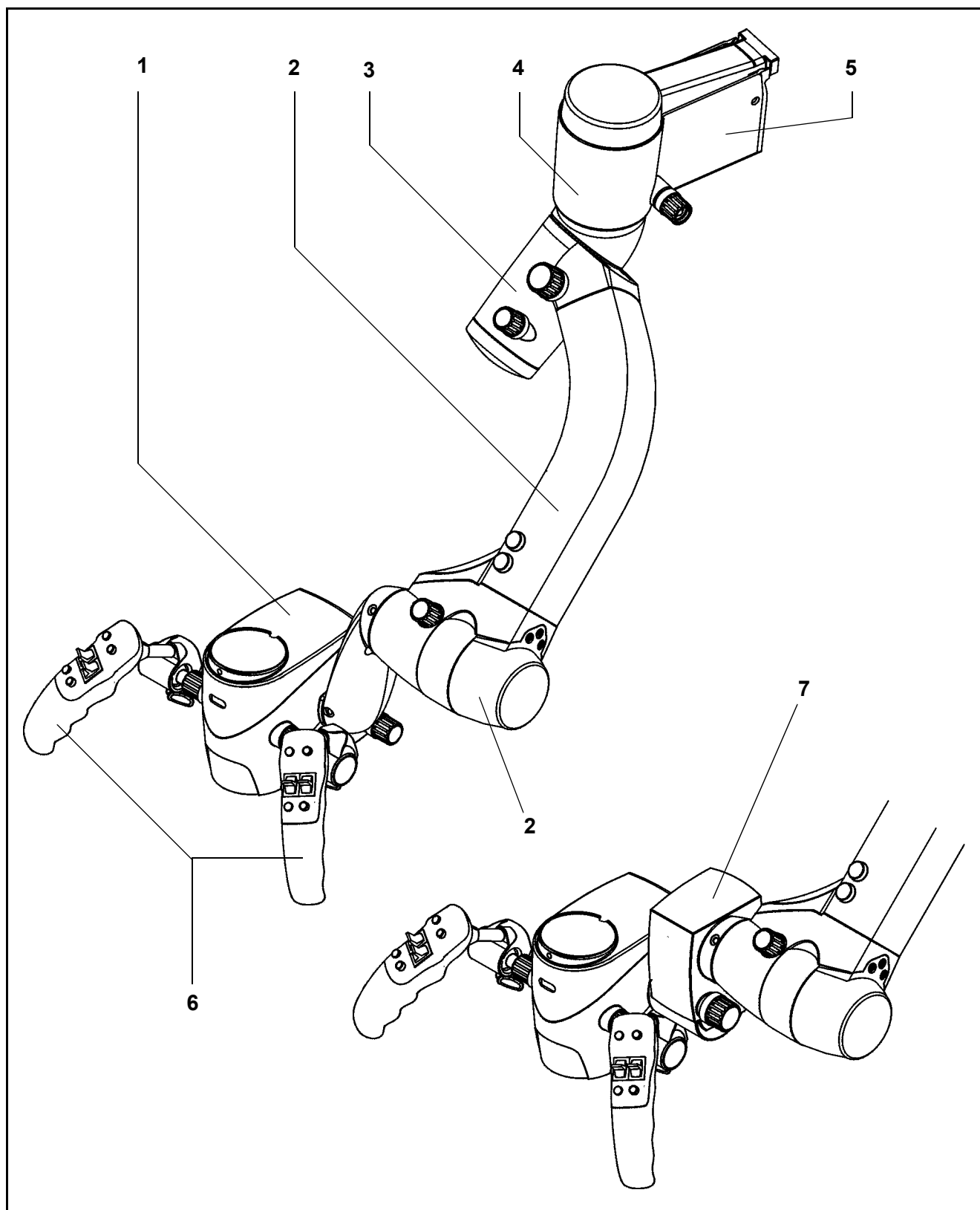
Controls, displays, connections

1 Friction adjustment for vertical axis
Use this knob to adjust the friction for the vertical axis as required.

2 Balance setting of the lateral tilt motion
Use this knob to adjust the balance setting of the lateral tilt motion.

3 Adjusting the friction of the lateral tilt axis
Use this knob to adjust the friction for the lateral tilt axis as required.

4 Balance setting of the front-to-back tilt motion
When you press this button, the microscope slowly tilts <u>upward</u>.

5 Balance setting of the front-to-back tilt motion
When you press this button, the microscope slowly tilts <u>downward</u>.

6 Adjusting the friction of the front-to-back tilt axis
Use this knob to adjust the friction for the front-to-back tilt axis as required.

Zero position

7 Marking for zero position
In the zero position, the microscope body is decoupled from the suspension (see "Balancing the front-to-back tilt motion").
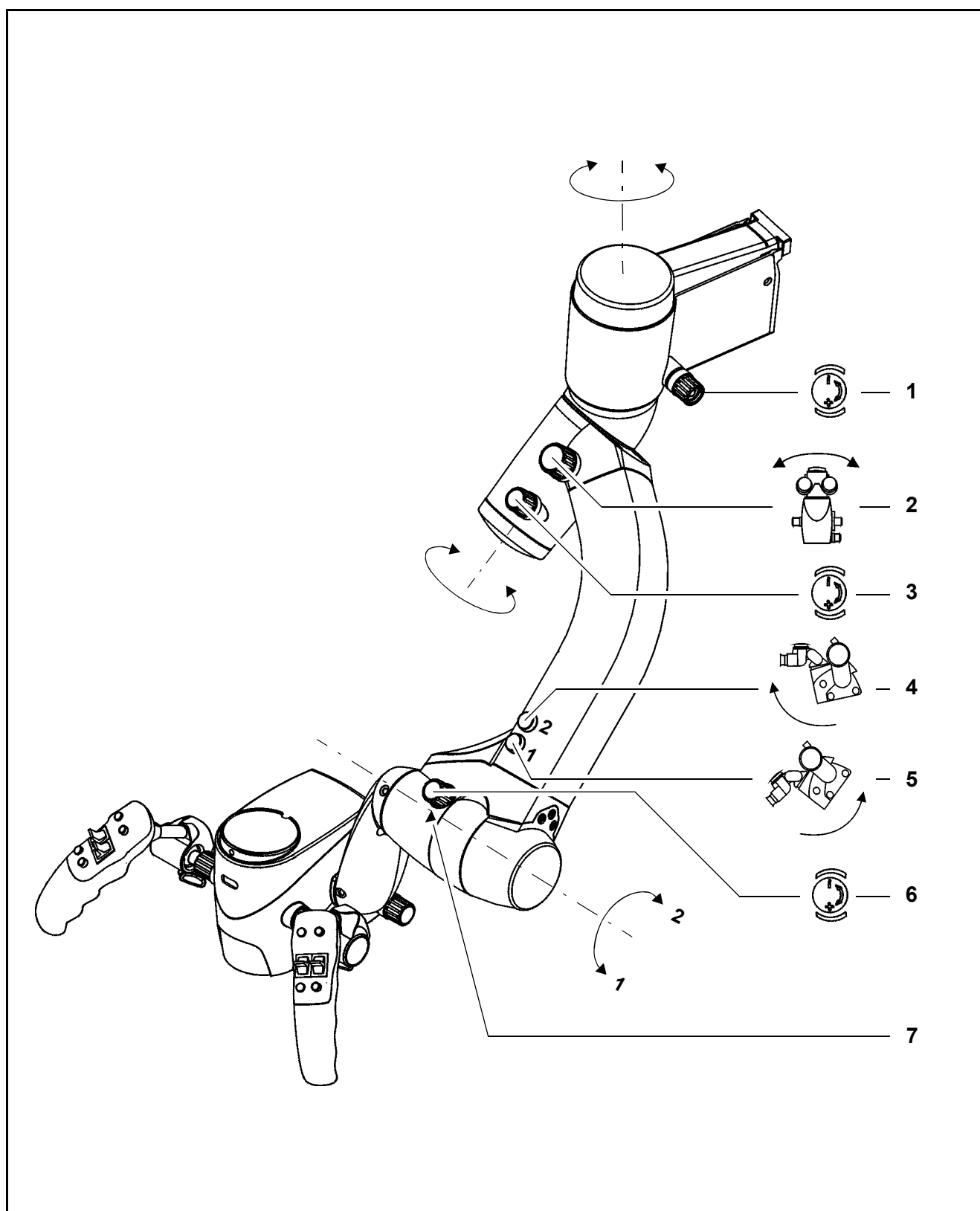
8 Dust cover

9 Handgrips (removable)
for moving the surgical microscope and triggering the motorized OPMI functions (see points 14 to 17).

10 Locking screw
for optimum positioning of the handgrips.

11 Zoom wheel (emergency operation)
If the motorized functions fail, you can manually adjust the magnification after removing the plastic cover from the zoom wheel.

12 Focusing knob
for manual adjustment of the image definition (focus, working distance).

13 Spot illumination knob
for continuous adjustment of the illuminated field diameter.

14 Focusing knob for use of a laser micromanipulator (option)
for manual adjustment of the image definition (focus) when a laser micromanipulator is used.
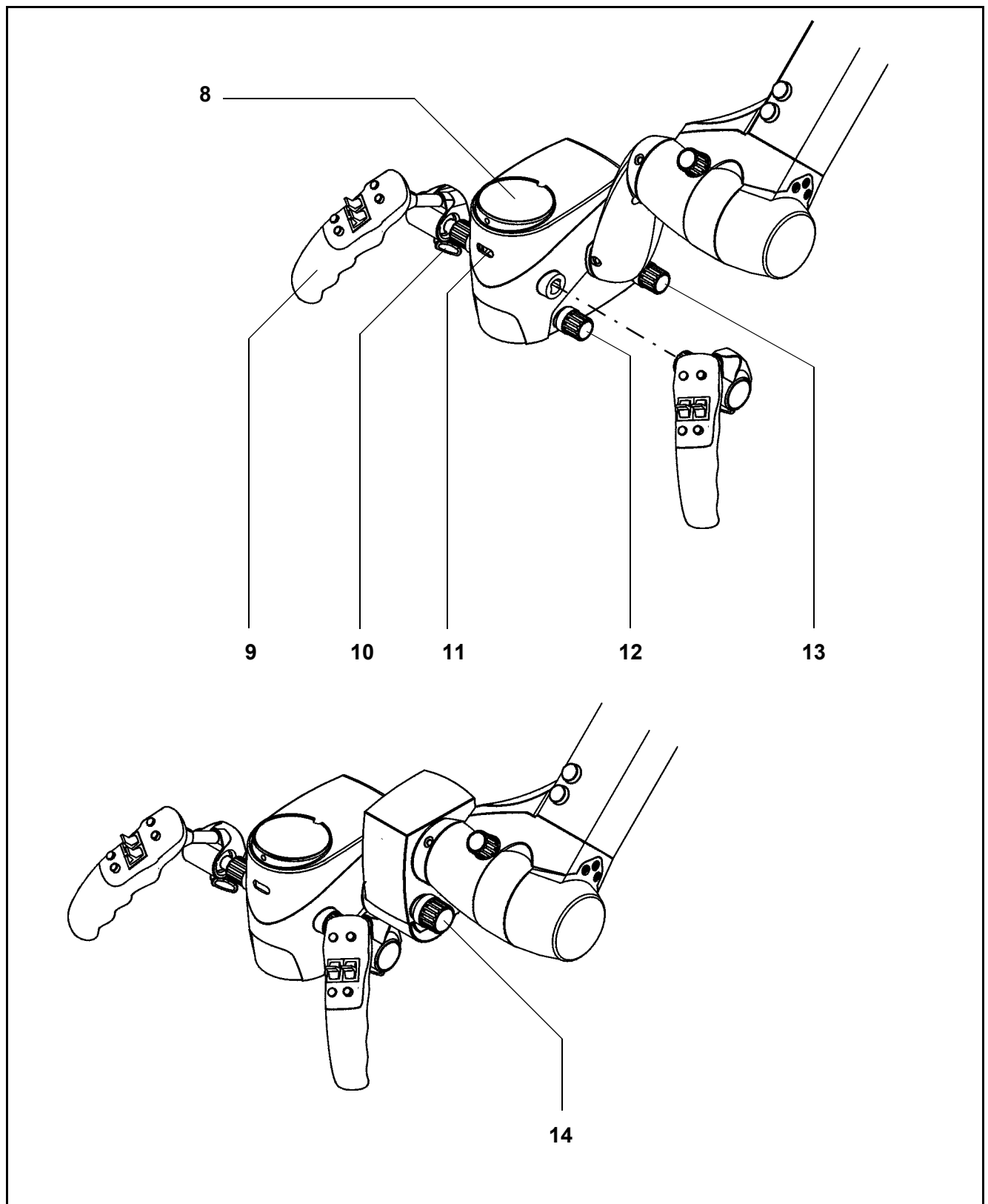
15 Release buttons, freely programmable
In combination with an S7 suspension system, specific functions of the suspension system can be assigned to these buttons (e. g.: focus, zoom, brightness control, still and video camera release, etc.). Configuring these buttons is described on page 91 (Handgrip Settings menu).
The default setting is brightness control.

16 Zoom rocker switch
for adjusting the magnification factor γ from 0.4x to 2.4x.

| **Z** |

17 Focus rocker switch
for continuous focusing within the working distance of 200 to 415 mm.

| **F** |

Note: The maximum value achievable can only be set manually.

18 Release buttons, freely programmable
In combination with an S7 suspension system, specific functions of the suspension system can be assigned to these buttons (e. g.: focus, zoom, brightness control, still and video camera release, etc.). Configuring these buttons is described in chapter "Description/Structure of the menus".

19 Locking the handgrips in position
Using this locking device, you can lock each handgrip in different positions.

20 Knurled nut
for removing the handgrips.

21 Knobs instead of handgrips
After removing the handgrips, mount the knobs supplied to protect the connector contacts and to be able to guide the surgical microscope. These knobs can be provided with sterile caps.

22 Labeling fields
Labeling fields are provided for the freely programmable handgrip buttons. On delivery, you receive a labeling set (small stickers) for each handgrip, permitting you to label the handgrips in accordance with your specific button assignment.

The labeling set includes not only stickers with abbreviations for the functions provided, but also with the letters A, B, C and D.
If several users with different button configurations are working on the system, operating errors can be avoided by labeling the freely programmable buttons with A, B, C, D or E instead of specific functions, i.e. by using the same designations for the buttons as in the description of the menus, see from page 91.

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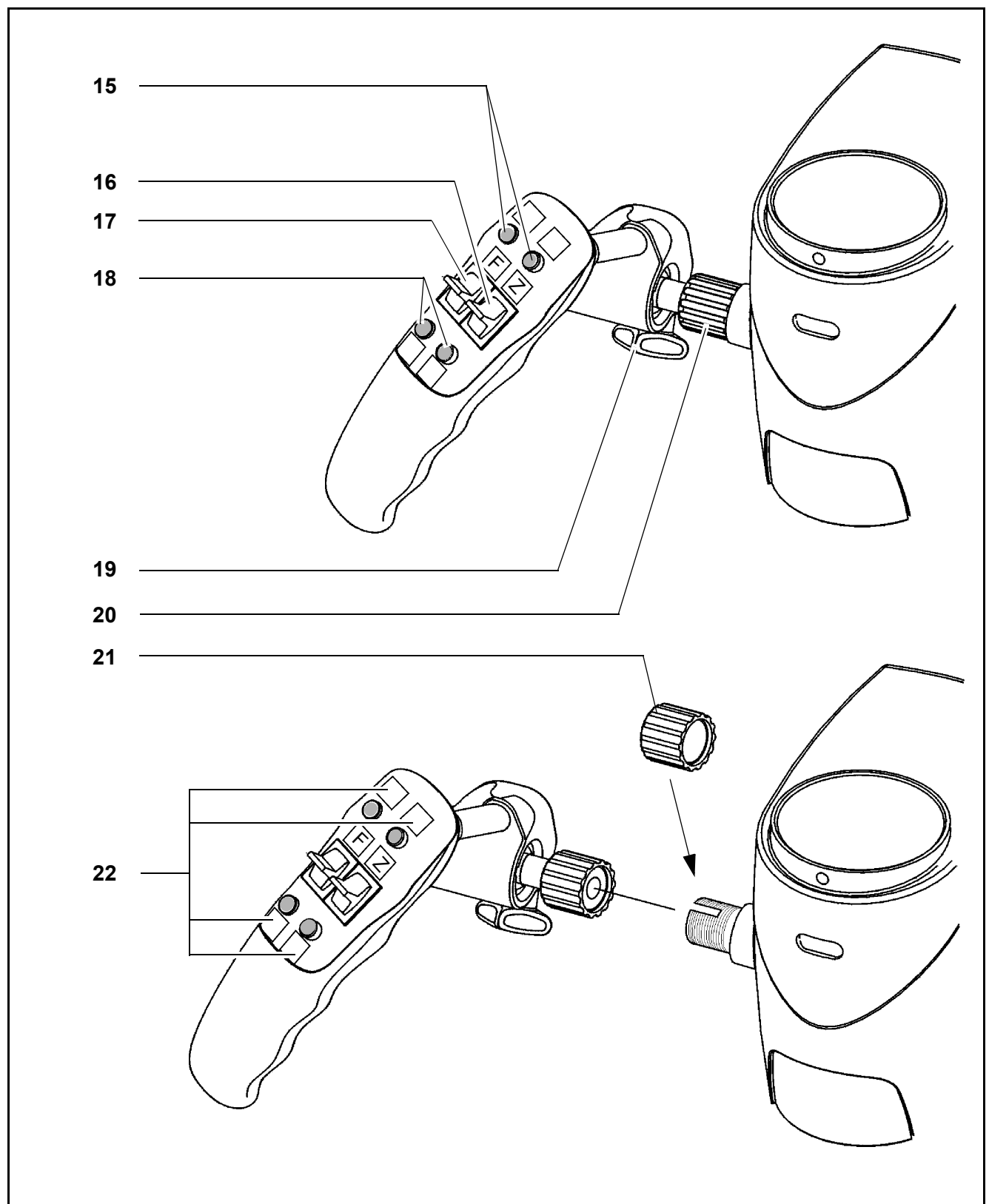
Tiltable binocular tube and eyepieces

180° tiltable tube

1 PD adjustment knob
The correct position has been set when the two eyepiece images merge into one.

2 180° tiltable tube

3 Eyepiece tube

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Carl Zeiss
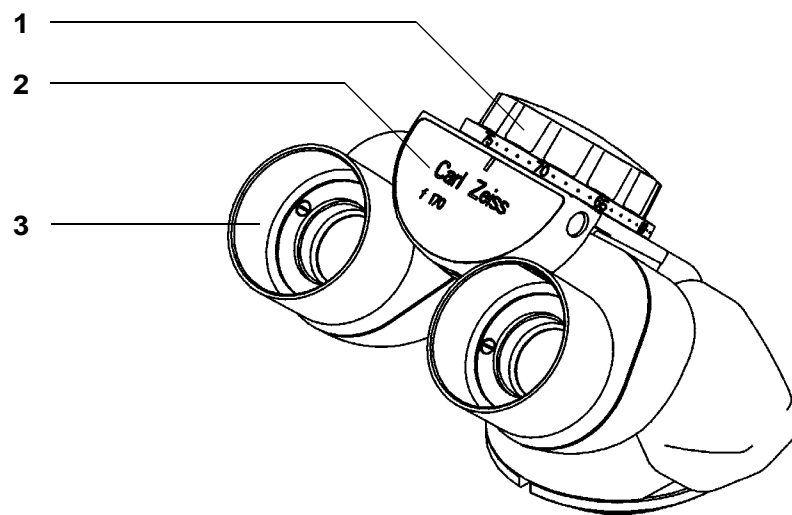
Widefield eyepieces with magnetic coupling

Note:
When you remove these eyepieces from the tube, please note that they are fitted with a magnetic coupling. When mounted, the eyepieces display a very weak magnetic field, so that the usual rules for the handling of magnets must only be observed with eyepieces which have not been mounted on the microscope:

• Do not place the eyepieces close to instruments where there is any risk of magnetization.

• Do not place the eyepieces on sensitive electronic units such as infusion pumps, cardiac pace-makers, measuring instruments or magnetic data carriers such as disks, audiotapes and videotapes, or credit cards.

• Always store eyepieces not used in their original packaging.

1 Eyecup
Always adjust the eyecups in such a way that you can see the full field of view.

    – Viewing with eyeglasses: Screw in the eyecups all the way.

    – Viewing without eyeglasses: Screw out the eyecups until you see the full field of view.

2 Diopter adjustment ring
The eyepieces provide ametropia compensation between -8 D and +5 D. Eyeglass wearers who perform surgery wearing their glasses set the diopter adjustment ring to 0 D. Turn the ring until you have obtained the optimum setting. An integrated brake holds the ring in the position set.

3 Diopter scale
for reading the prescription set.
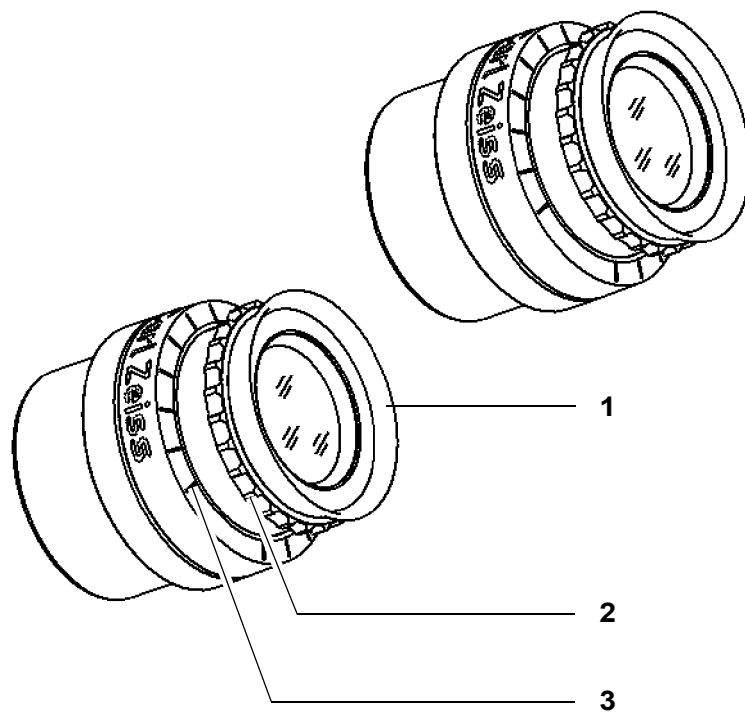
S7 floor stand

Design

1 Suspension arm

2 Lamp housing (either xenon or halogen illumination)

3 Carrier arm

4 Control panel

5 Connector panel

6 Maneuvering handle

7 Cable supports (2x, on the right and left of the stand column)

8 Stand column

9 Stand base

1

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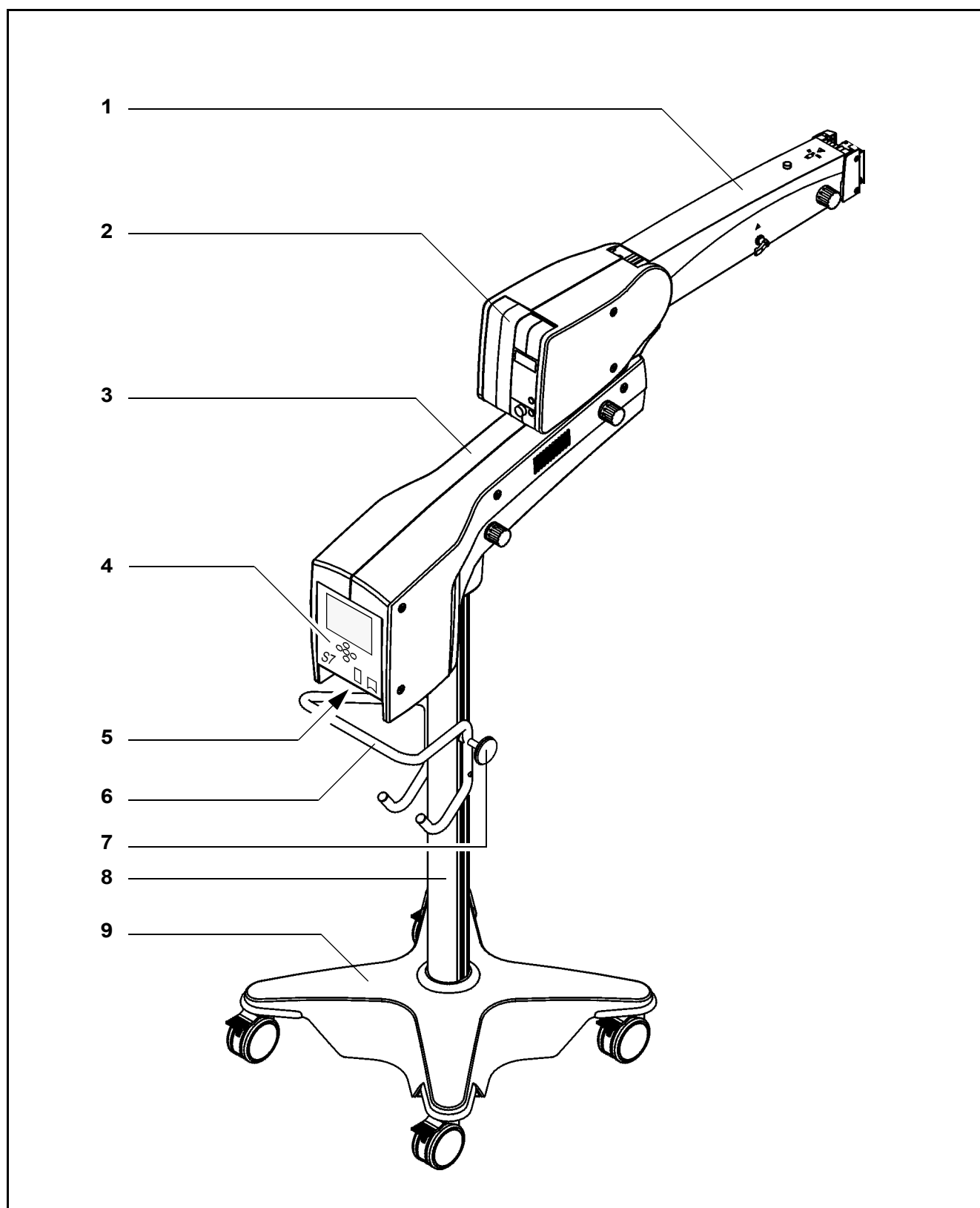
Controls, displays, connections

Suspension arm

1 Lamp housing with halogen or xenon illumination
The suspension system is equipped with an illumination system for light guides. Each lamp housing contains a backup lamp. When a halogen illumination system is used, the backup lamp will be automatically swung in if the first lamp fails. When a xenon illumination system is used, you must manually swing the backup lamp into the beam path if the first lamp fails.

2 Friction adjustment
Knob for adjusting the friction of the suspension arm's upward/downward movement.

3 Locking lever for limiting the arm's downward movement
You can limit the downward movement of the suspension arm by adjusting a stop.
Adjustment range: from the horizontal position of the suspension arm to its lower stop.

– Balance +

4 Balance setting
Knob for setting the spring force for balancing. After mounting the surgical microscope including all accessories, balance the suspension arm using this screw. The balance setting procedure is described in the chapter "Preparations for use/Adjusting the system".

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Carrier arm, stand column, stand base

1 Control and display panel
The control and display panel permits you to control all electrical functions of the S7 floor stand and the surgical microscope.

2 Friction adjustment
Knob for adjusting the friction of the carrier arm's swivel movement.

3 Handle
for moving the floor stand. Before relocating the stand, you can hang the foot control panel and wind up the cables on the lower end of the handle.

4 Connector panel
for connecting the unit to line power. Further connectors are provided for powering peripheral equipment. A foot control panel can be connected to a multi-point connector.

5 Friction adjustment
Knob for adjusting the friction of the suspension arm's swivel movement.

6 Cable support
for winding up the power cord and the cable of the foot control panel.

7 Support for foot control panel

8 Locking tab
for steerable caster (4 casters are provided).
To secure the stand in position, press down at least two locking tabs.
Press down to lock the caster.
Press up to release the caster.

9 Steerable caster
The four casters roll very smoothly, permitting the unit to be easily wheeled to the site of use.
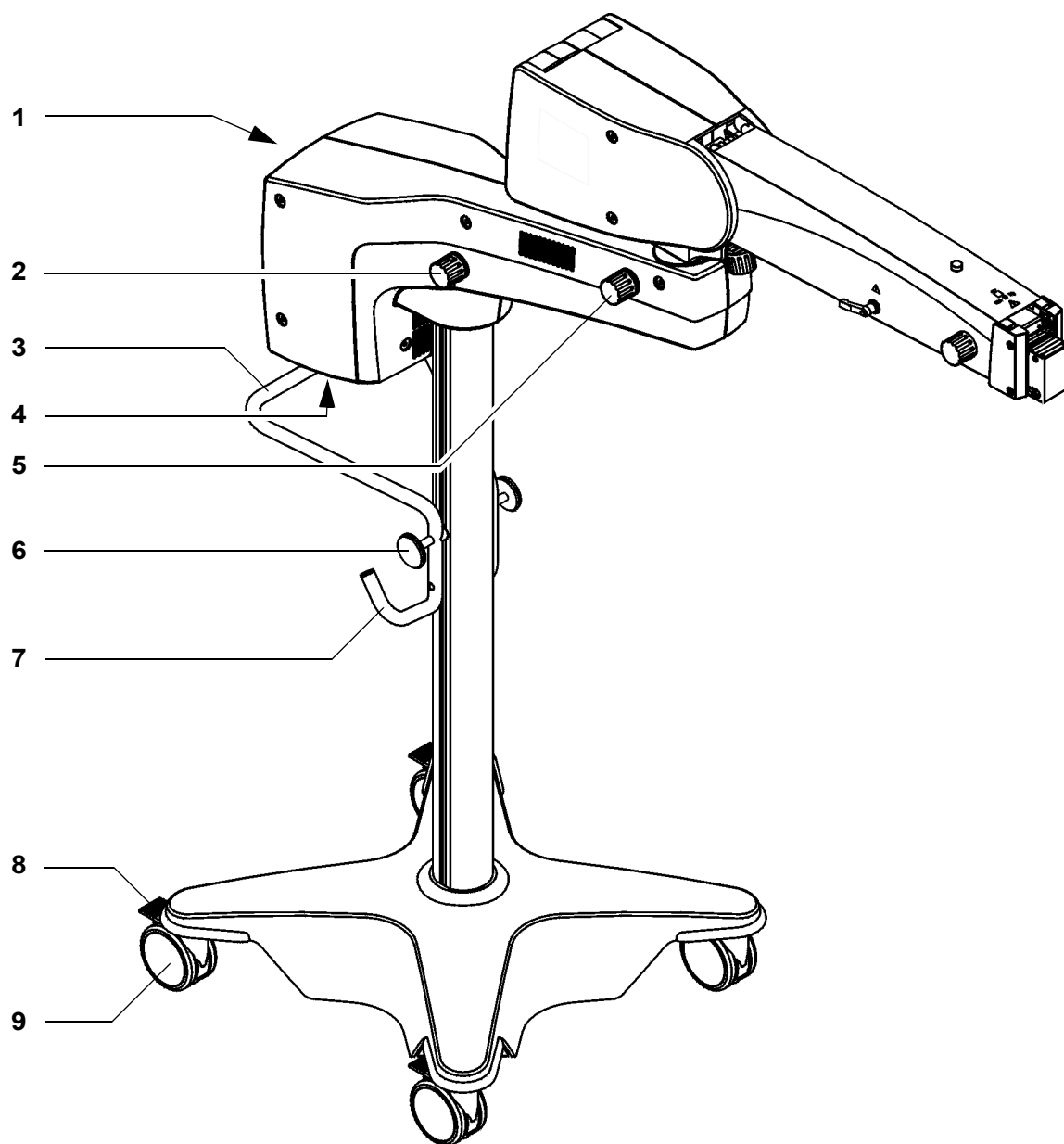
Connector panel of S7 floor stand

1 Opening for the system cable of an external video camera

2 Remote control socket
for controlling MediLive ImageBox, MediLive MindStream or other external devices with a maximum breaking capacity of 24V/0.5A.

3 Strain relief device
The strain relief device prevents inadvertent unplugging of the following electrical connections:

– power cable,

– video connection cable,

cable for the foot control panel (option).

4 Connector for control component (option)
Here, a foot control panel can be connected.

Warning!
Please observe the maximum current consumption of power outlet socket (5). Only connect medical devices approved by Carl Zeiss to this outlet. When using other instruments, make sure that safety is guaranteed regarding admissible ground leakage currents. The admissible limit value of the ground leakage current present in the suspension system's power cord must not exceed 500 μA in compliance with EN 60601-1/IEC 60601-1. CSA/US certification in compliance with UL 60601-1 only allows a maximum ground leakage current of 300 μA.

5 Power outlet socket
for medical devices with a maximum current consumption of 5 A.
Warning!
The current of this power outlet socket <u>cannot</u> be switched off with the power switch.

6 Power inlet socket

Connectors for USB option

7 USB socket for USB memory stick
<u>Note:</u>
Only use sticks conforming to the USB-2.0 specification.

8 DV output port (FireWire)
Digital, compressed video signal for recording on a digital video recorder or PC.

9 BNC video port (option)
for VBS video signal output

10 Y/C video port (option)
for S-VHS video signal output

11 Potential equalization pin

12 Indicator window for rated voltage
The voltage shown here must correspond to the rated line voltage pro-
vided on the site of installation. You can adjust the sliding switch using
a suitable tool.
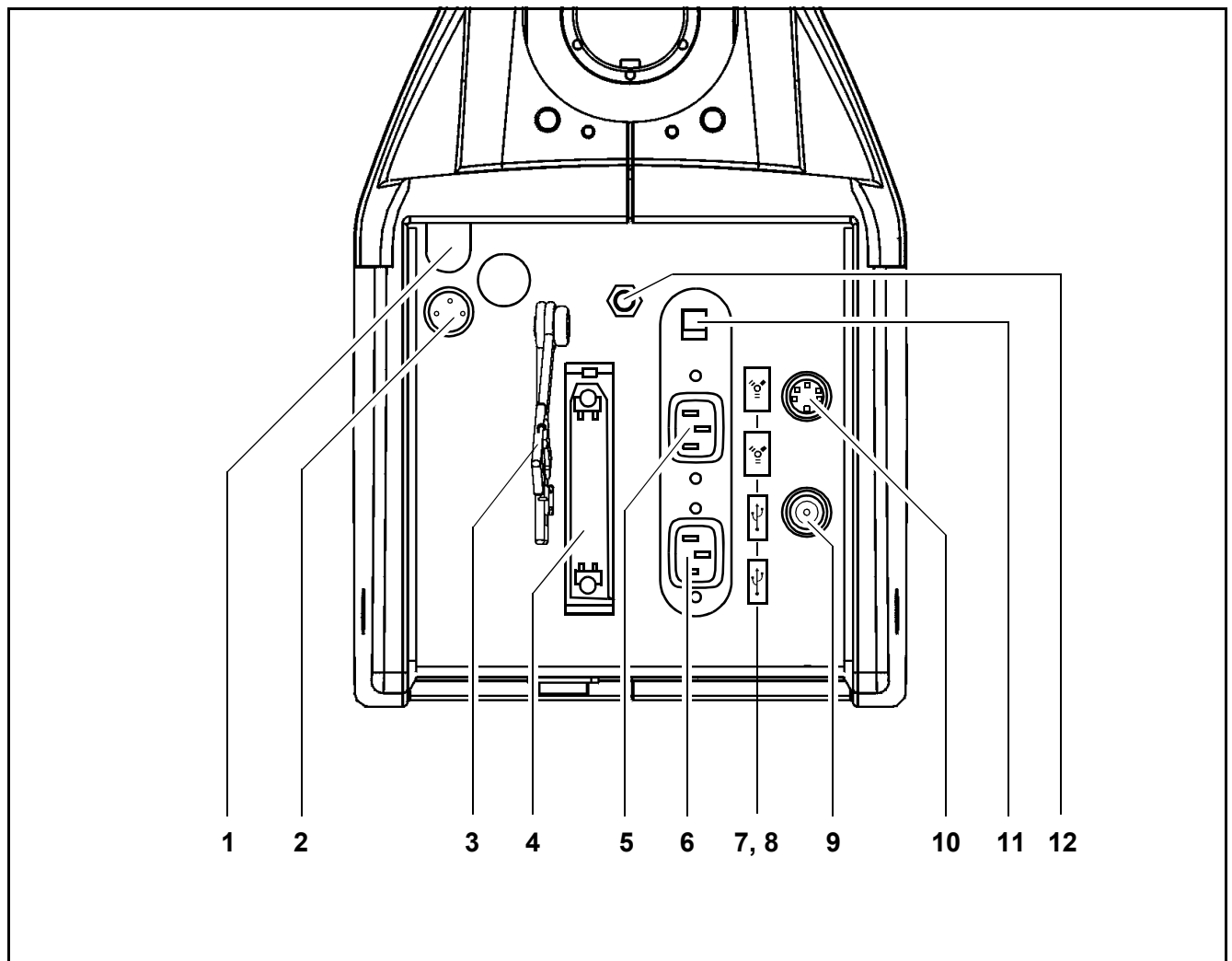
Instrument tray (option)

The S7 floor stand can be equipped or retrofitted with an instrument tray (1). In the case of retrofitting, our service staff or an authorized person will mount the instrument tray on your stand.

The maximum load on instrument tray (1) must not exceed 13 kg! The tray has been designed, for example, for mounting MediLive Trio from Zeiss:

– MediLive Trio is secured on the instrument tray using two stud bolts.

– A second MediLive Trio or other accessory equipment can be mounted on the instrument tray using the strap provided. Please note the instrument tray's maximum load capacity of 13 kg.

Warning!
• Make sure that the accessory equipment is positioned as securely as possible on the instrument tray.

• Mount MediLive Trio on the instrument tray using the two stud bolts.

• If required, secure further accessory equipment on the tray using the strap provided.

• Do not place a load of more than 13 kg on instrument tray (1).

• Remember there is a risk of collision and crushing when suspension arm (2) is folded to its moving position. A "Risk of crushing" warning label is therefore attached on the left and right of suspension arm (2).

• Please read the relevant user manual before starting up the accessory equipment.

• Never pull or push at the accessory equipment (3) in order to move the S7 floor stand. Always use only maneuvering handle (4) to move the S7 floor stand.
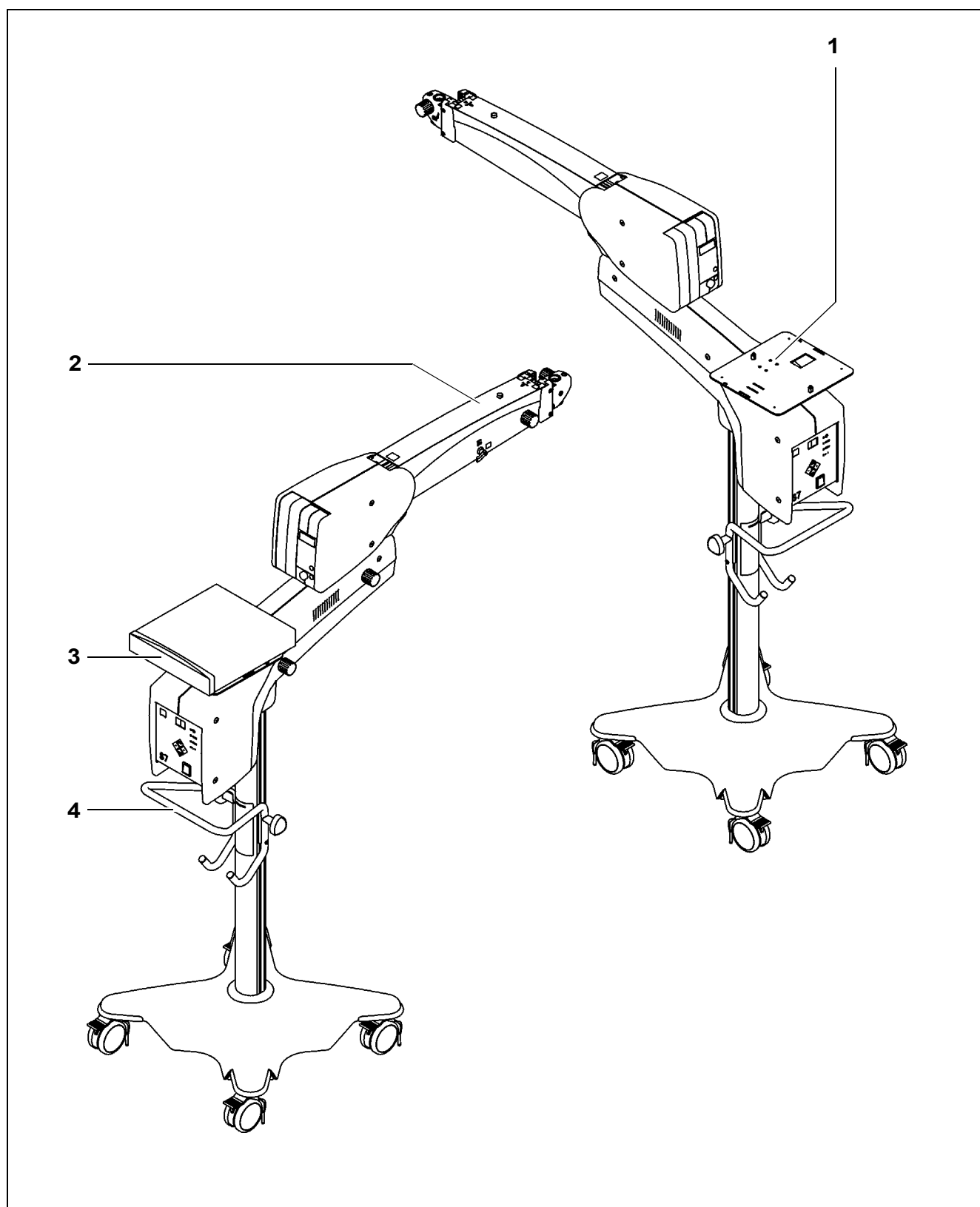
S7 ceiling mount

Design

1 Ceiling flange

2 Ceiling column

3 Control panel

4 Connector panel

5 Lamp housing (either xenon or halogen illumination)

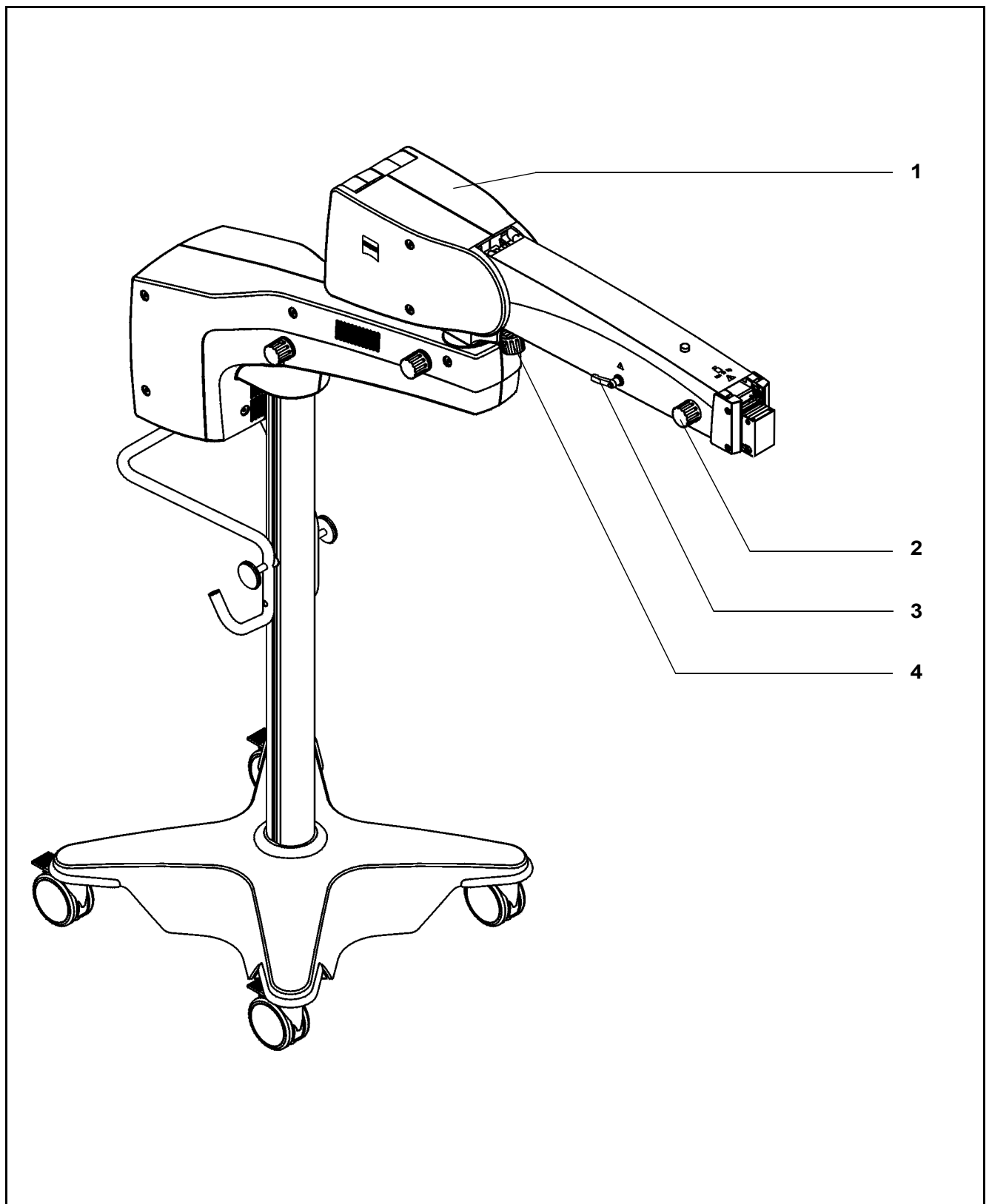**6** Carrier arm

7 Suspension arm
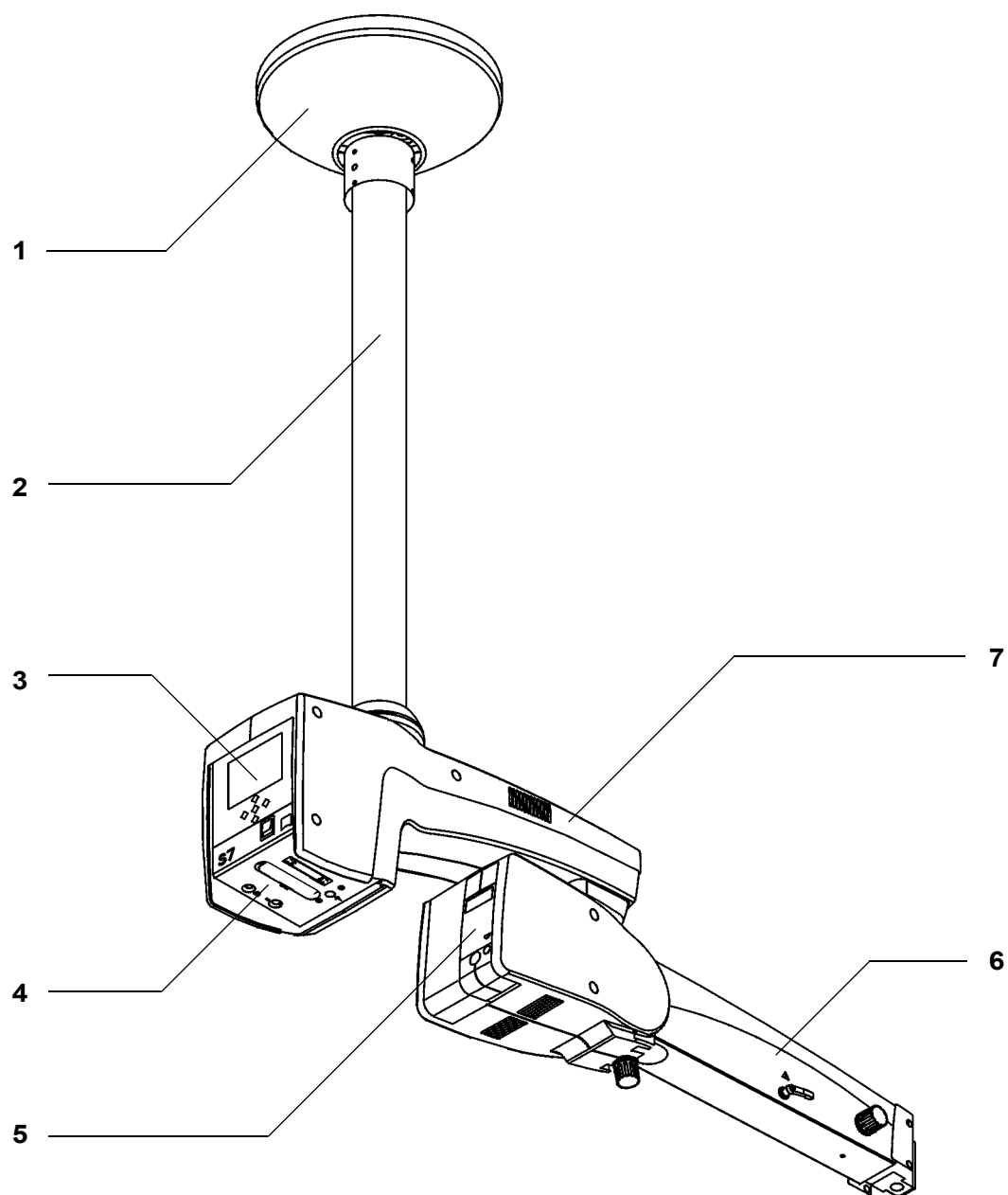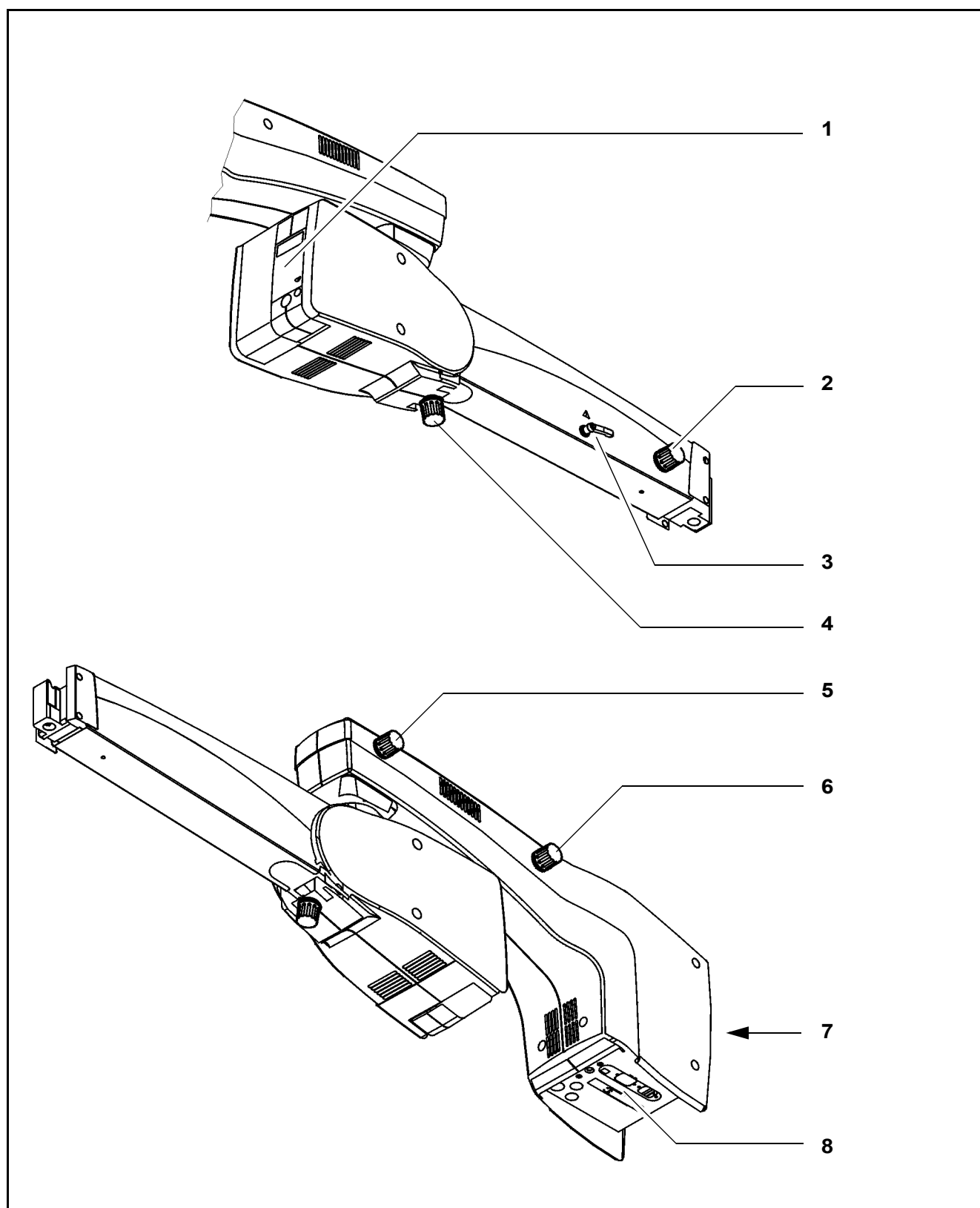
# Controls, displays, connections

Carrier and suspension arms

1 Lamp housing with halogen or xenon illumination
The suspension system is equipped with an illumination system for light guides. Each lamp housing contains a backup lamp. When a halogen illumination system is used, the backup lamp will be automatically swung in if the first lamp fails. When a xenon illumination system is used, you must manually swing the backup lamp into the beam path if the first lamp fails.

2 Friction adjustment
Knob for adjusting the friction of the suspension arm's upward/downward movement.

3 Locking lever for limiting the arm's downward movement
You can limit the downward movement of the suspension arm by adjusting a stop.
Adjustment range: from the horizontal position of the suspension arm to its lower stop.

4 Balance setting
Knob for setting the spring force for balancing. After mounting the surgical microscope including all accessories, balance the suspension arm using this screw. The balance setting procedure is described in the chapter "Preparations for use" under "Adjusting the system".

– Balance +

5 Friction adjustment
Knob for adjusting the friction of the suspension arm's swivel movement.

6 Friction adjustment
Knob for adjusting the friction of the carrier arm's swivel movement.

7 Control and display panel
The control and display panel permits you to control all electrical functions of the S7 suspension system and the surgical microscope.

8 Connector panel
Further connectors are provided for powering peripheral equipment. A foot control panel (option) can be connected to a multi-point connector.

Connector panel of S7 ceiling mount

1 Opening for the system cable of an external video camera

2 Remote control socket
for controlling MediLive ImageBox, MediLive MindStream or other external devices with a maximum breaking capacity of 24V/0.5A.

3 Strain relief device
The strain relief device prevents inadvertent unplugging of the following electrical connections:

– video connection cable

– cable for the foot control panel (option).

4 Connector for control component (option)
Here, a foot control panel can be connected.

Connectors for USB option

5 USB socket for USB memory stick
<u>Note:</u>
Only use sticks conforming to the USB-2.0 specification.

6 DV output port (FireWire)
Digital, compressed video signal for recording on a digital video recorder or PC.

7 BNC video port (option)
for VBS video signal output.

8 Y/C video port (option)
for S-VHS video signal output.

9 Indicator window for rated voltage
The voltage shown here must correspond to the rated line voltage provided on the site of installation. You can adjust the sliding switch using a suitable tool.
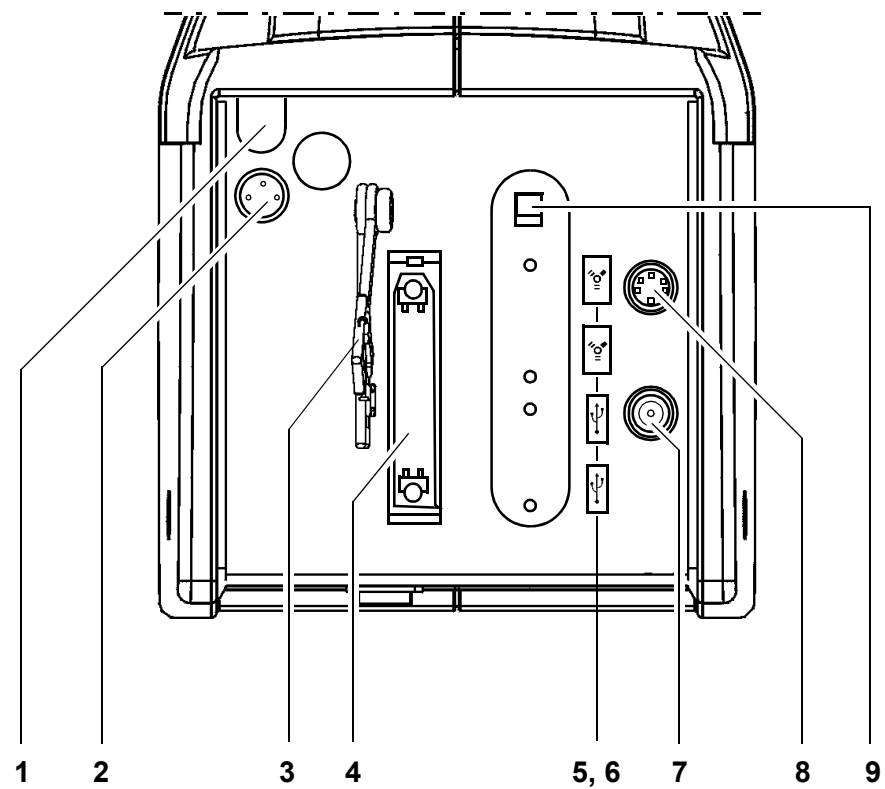
S7 ceiling mount with lifting column

Design

1 Ceiling flange

2 Lifting column

3 Control panel

4 Connector panel

5 Lamp housing (either xenon or halogen illumination)

6 Suspension arm

7 Carrier arm
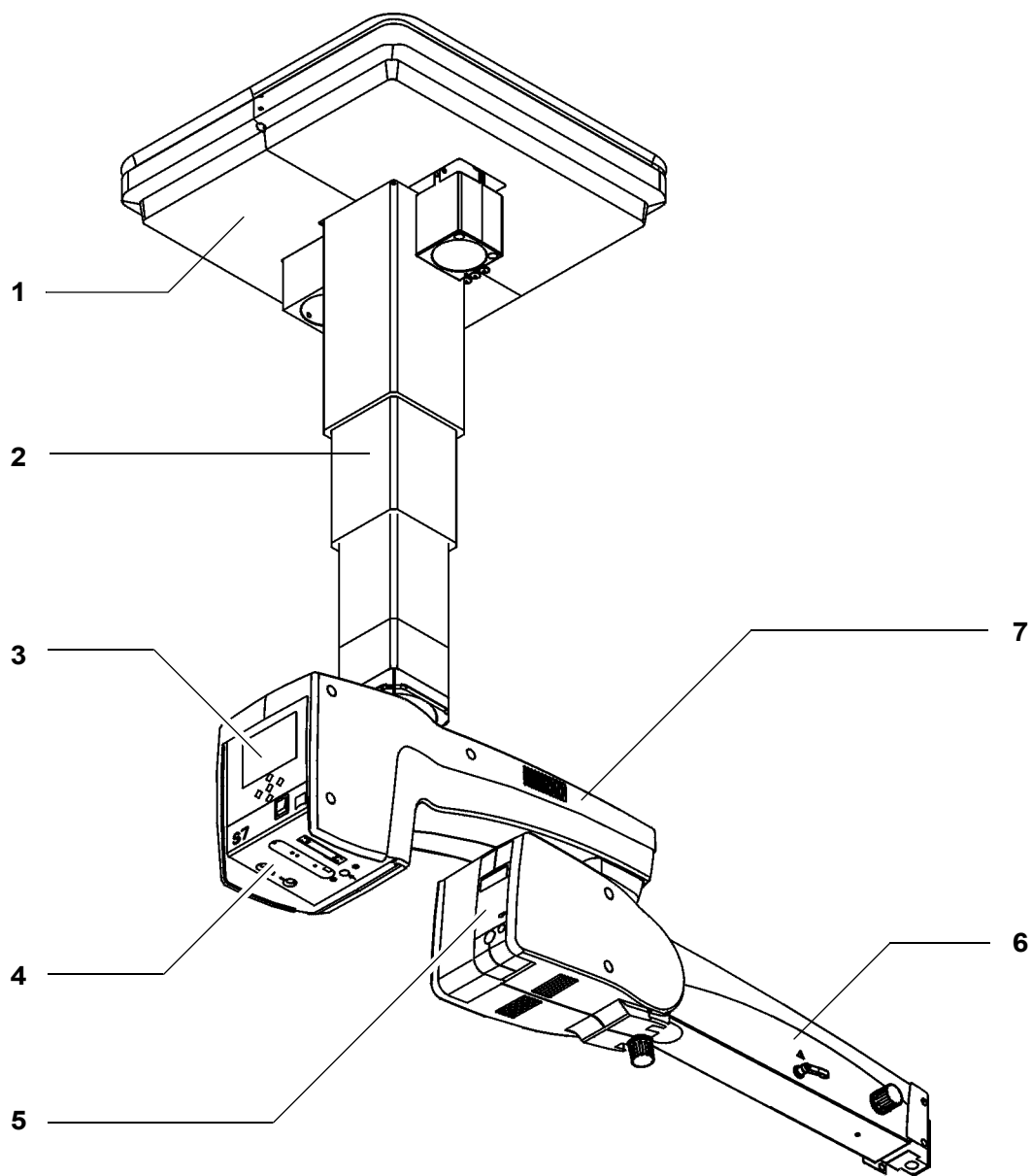
Controls, displays, connections

Ceiling flange with lifting column
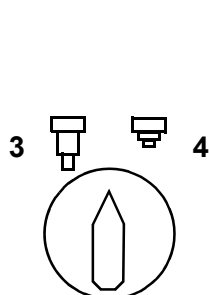
1 Lifting column

2 Selector switch
for setting the optimum viewing height of the surgical microscope or for downward movement into the working position.
As long as you keep the selector switch in the turned position, the lifting column moves upward (4) or downward (3), depending on the switch position. When you release the selector switch, the lifting column stops immediately.
The switching technology causes a delay of approx. 2 seconds at the upper and lower end positions of the lifting column. After this time, you can move the column in the opposite direction again by activating the selector switch.

The lifting column is used to move the microscope into position for surgery prior to the surgical procedure.
Do not constantly move the lifting column up and down, since a thermal cut-out will then automatically deactivate the drive motor. If this occurs, the lifting column cannot be moved until the motor has cooled down.

Warning!

– Do <u>not</u> activate the lifting column during surgery!

– Do <u>not</u> use the lifting column for focusing.

– Make sure that the patient is <u>not</u> put at risk or injured by the motorized adjustment of the lifting column.

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2

Carrier and suspension arms

1 Lamp housing with halogen or xenon illumination
The suspension system is equipped with an illumination system for light guides. Each lamp housing contains a backup lamp. When a halogen illumination system is used, the backup lamp will be automatically swung in if the first lamp fails. When a xenon illumination system is used, you must manually swing the backup lamp into the beam path if the first lamp fails.

2 Friction adjustment
Knob for adjusting the friction of the suspension arm's upward/downward movement.

3 Locking lever for limiting the arm's downward movement
You can limit the downward movement of the suspension arm by adjusting a stop.
Adjustment range: from the horizontal position of the suspension arm to its lower stop.

– Balance **+**

4 Balance setting
Knob for setting the spring force for balancing. After mounting the surgical microscope including all accessories, balance the suspension arm using this screw. The balance setting procedure is described in the chapter "Preparations for use/Adjusting the system".

5 Friction adjustment
Knob for adjusting the friction of the suspension arm's swivel movement.

6 Friction adjustment
Knob for adjusting the friction of the carrier arm's swivel movement.

7 Control and display panel
The control and display panel permits you to control all electrical functions of the S7 suspension system and the surgical microscope.

8 Connector panel
Further connectors are provided for powering peripheral equipment. A foot control panel (option) can be connected to a multi-point connector.

Connector panel of S7 ceiling mount with lifting column

1 Opening for the system cable of an external video camera

2 Remote control socket
for controlling MediLive ImageBox, MediLive MindStream or other external devices with a maximum breaking capacity of 24V/0.5A.

3 Strain relief device
The strain relief device prevents inadvertent unplugging of the following electrical connections:

  – video connection cable

  – cable for the foot control panel (option).

2   **1**

4 Selector switch
for setting the optimum viewing height of the surgical microscope or for upward movement into the standby position.
As long as you keep the selector switch in the turned position, the lifting column moves upward (1) or downward (2), depending on the switch position. When you release the selector switch, the lifting column stops immediately.
The switching technology causes a delay of approx. 2 seconds at the upper and lower end positions of the lifting column. After this time, you can move the column in the opposite direction again by activating the selector switch.

5 Connector for control component (option)
Here, a foot control panel can be connected.

Connectors for USB option

6 USB socket for USB memory stick
<u>Note:</u>
Only use sticks conforming to the USB-2.0 specification.

7 DV output port (FireWire)
Digital, compressed video signal for recording on a digital video recorder or PC.

8 BNC video port (option)
for VBS video signal output

9 Y/C video port (option)
for S-VHS video signal output

10 Indicator window for rated voltage
   The voltage shown here must correspond to the rated line voltage pro-
   vided on the site of installation. You can adjust the sliding switch using
   a suitable tool.

| 1 | 2 | 3 | 4 | 5 | 6, 7 | 8 | 9 | 10 |
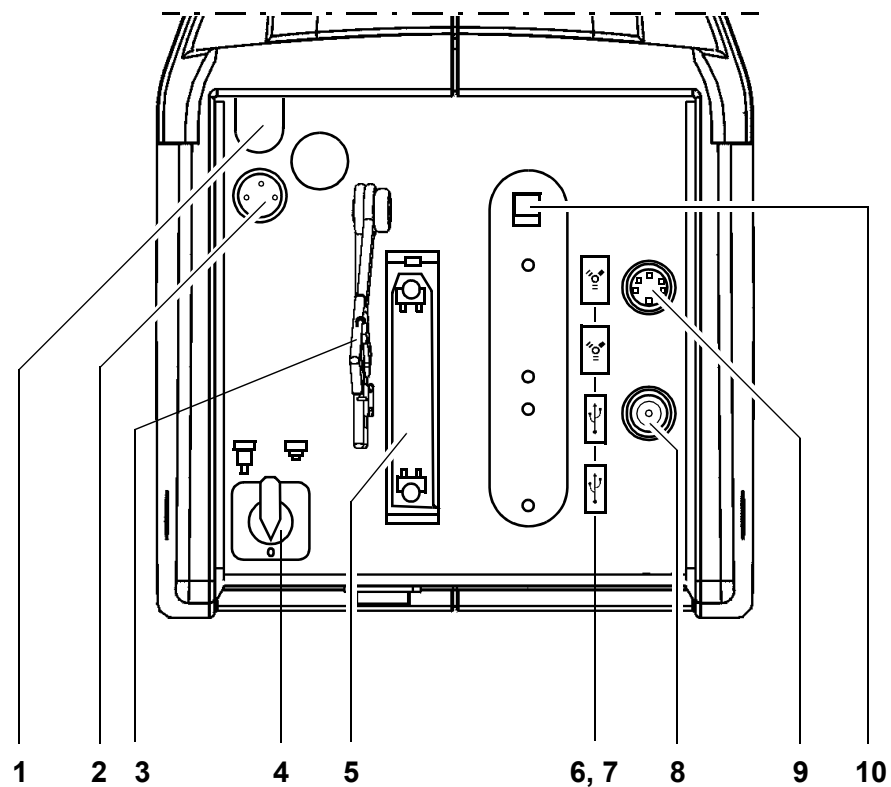
Illumination system

Two different types of illumination are available for the suspension system.

1 Halogen illumination
The halogen light source is equipped with an illumination system for fiber illumination. The lamp housing contains a backup lamp which is automatically swung into the illumination beam path when the first lamp fails.

2 Xenon illumination system
The xenon light source is equipped with an illumination system for fiber illumination. The xenon lamp generates light whose spectrum resembles that of natural daylight. Regardless of the brightness setting, the color temperature of the light always remains the same. Normal daylight film without any additional conversion filters can therefore be used for photographic documentation. The lamp module contains two xenon lamps. The second lamp is used as a backup lamp which can be manually swung into the illumination beam path when the first lamp fails.
You have to pull out the lamp module all the way before being able to swing in the backup lamp.

Warning!
The xenon illumination must <u>not</u> be used for ophthalmic procedures.
Make sure that no xenon light enters the patient's eyes during paranasal sinus surgery. Use the spot illumination and cover the eyes of the patient.
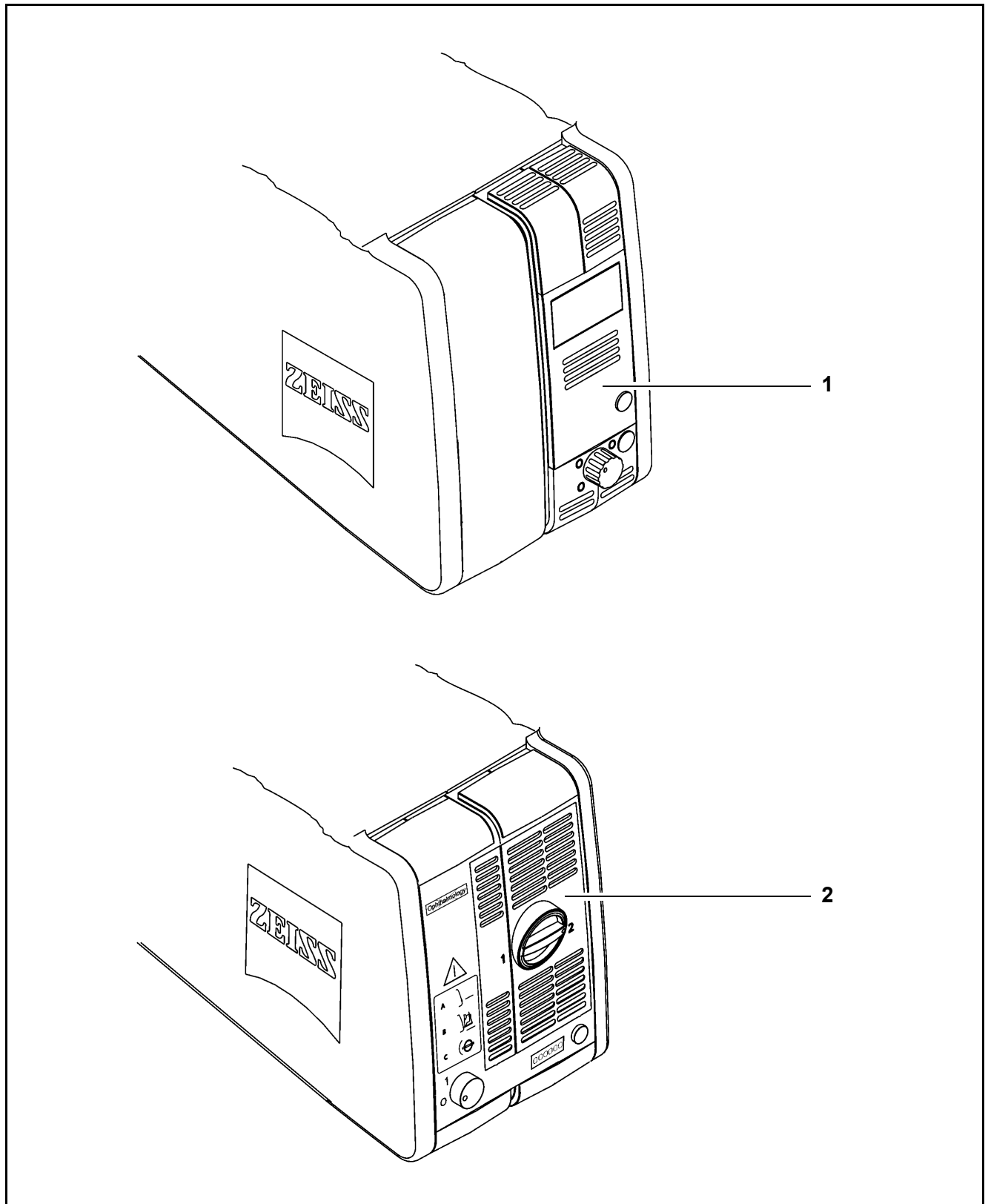
Halogen illumination system

The illumination system has been designed for fiber illumination. The lamp housing contains a backup lamp which is automatically swung into the illumination beam path when the first lamp fails.

1 Lamp module

2 **Caution:**
Do not cover the ventilation grid! For example, drapes could be covering the grid. This can lead to overheating of the lamp modules and to lamp failure.

3 Flap
The flap is the mechanical indicator for the operating status of the halogen lamps.

– When the flap is closed, the main lamp is operative.

– When the flap is open, the main lamp has failed. The backup lamp is on.

4 Manual selection of the backup lamp
If the automatic selector system fails, press this button to switch on the backup lamp.

5 Opening the lamp module
When you press this button, the lamp module is slightly ejected. Pull out the lamp module all the way for lamp change.

6 Filter selector knob
The filter selector knob has four positions:

0 no filter

1 GG 475 filter: to protect the patient's eye during surgery against unnecessary (blue) radiation (retinal injury).

2 KK 40 filter: to increase the color temperature
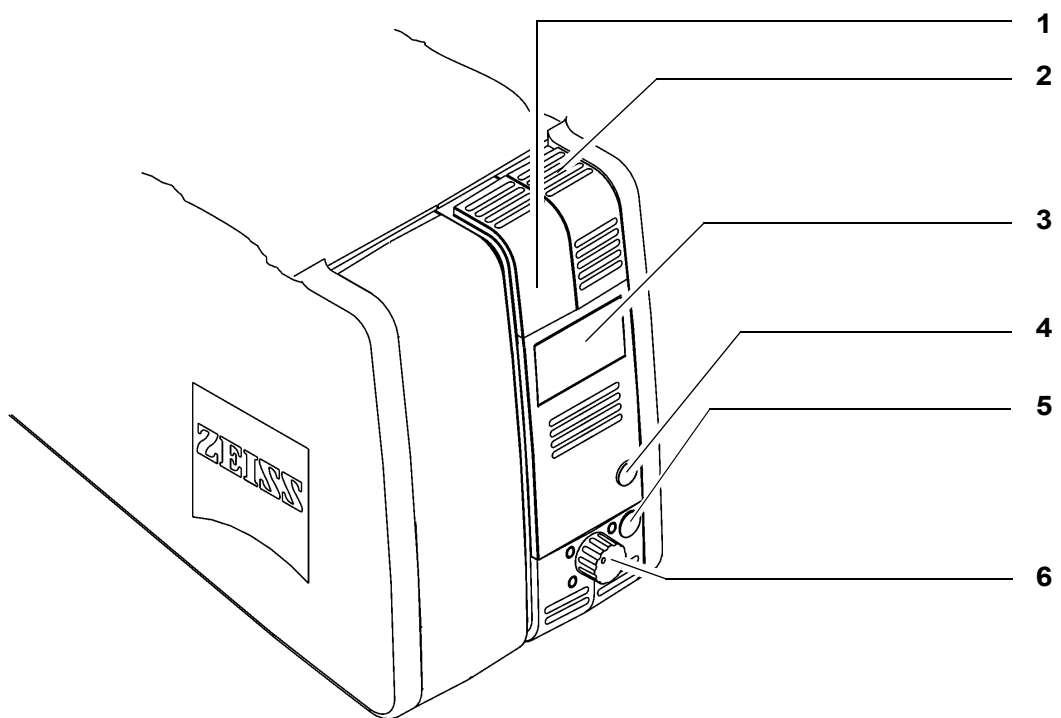
3 no filter

Xenon illumination system

Warning!

The xenon lamp has a limited service life of 500 h.

If used beyond its maximum service life, the xenon lamp may explode.

Change the xenon lamp in good time.

The xenon illumination system has been designed for fiber illumination. The xenon lamp generates light whose spectrum resembles that of natural daylight. Regardless of the brightness setting, the color temperature of the light always remains the same. Normal daylight film without any additional conversion filters can therefore be used for photographic documentation. The lamp housing contains two xenon lamps. The second lamp is used as a backup lamp which must be swung into the illumination beam path should the first lamp fail.

Warning!

If the xenon light source is used, the unit must not be used in ophthalmic applications. Severe injury to the patient's eye is possible.

Caution:

Do not cover the ventilation grid! For example, drapes could be covering the grid. This can cause the lamp modules to overheat and lead to lamp failure.

1 Lamp module

2 Manual activation of the backup lamp

• If the xenon lamp fails, open the lamp module as follows: Press button (7). The lamp module is slightly ejected.

• Pull out the lamp module as far as it will go.

• Turn knob (2) through 180° until it snaps in place. This moves the backup lamp into the illumination beam path.

• Push the lamp module all the way back into the lamp housing.

• Reset service hour counter (5) to "0". Use a pointed object and press it into the recess of reset button (6).

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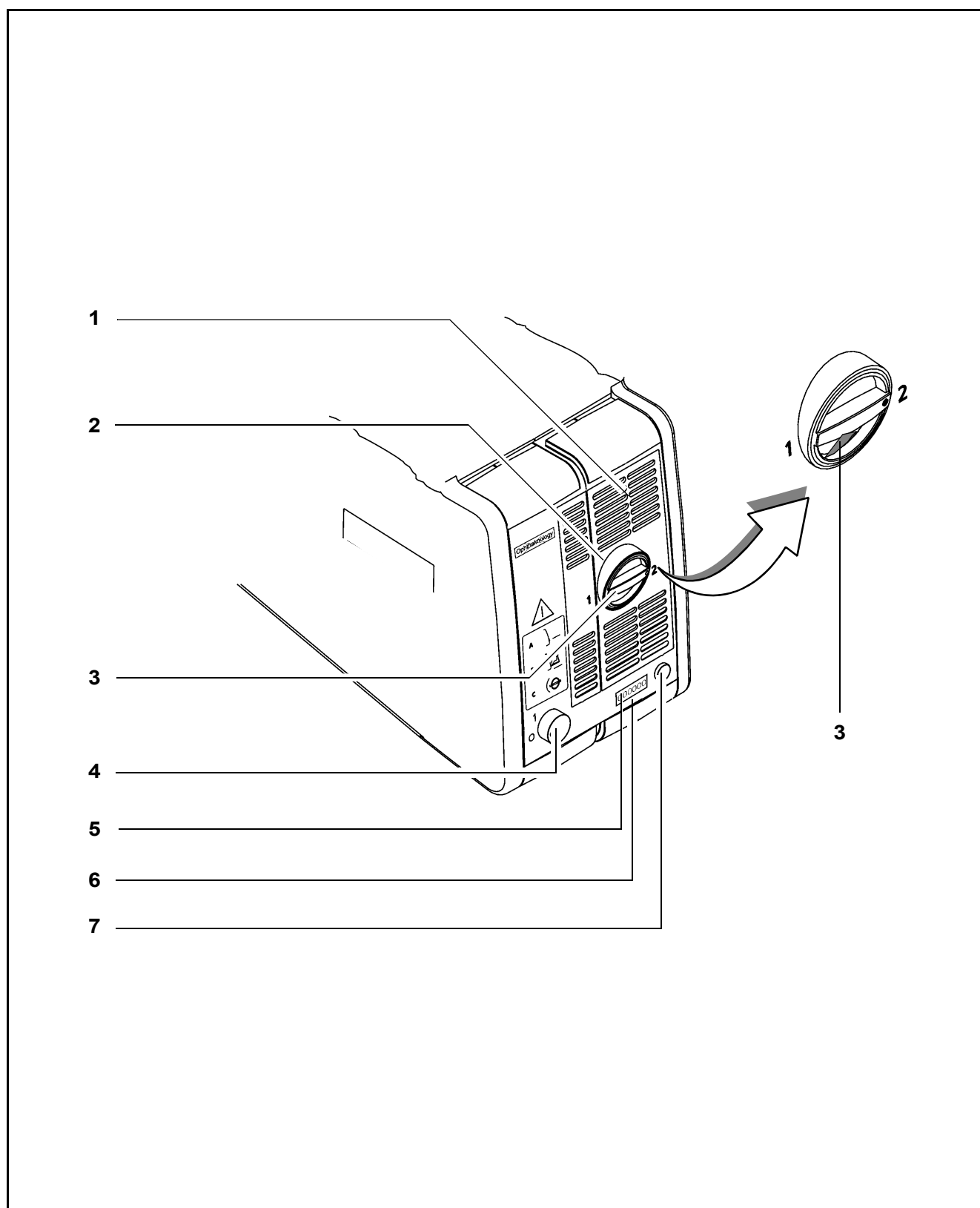
Note:
When inserting a new lamp module, make sure that the knob (2) is set to "1". If the first lamp fails, switch to the second lamp in logical sequence.

3   Indicator: backup lamp is in use
When the red segment in the knob (2) lights up, the backup lamp is in use.

4   Filter selector knob
The filter knob has two positions:

   0   No filter

   1   Filter (if provided) in beam path

5   Counter
The counter records the service hours of the xenon light source.

•   Change the xenon lamps after a maximum operating time of 500 hours to avoid any explosion of the xenon lamps. Then reset the counter to "0" by pressing reset button (6).

6   Reset button
The reset button resets the service hour counter to "0".

7   Opening the lamp module
When you press this button, the lamp module is slightly ejected. To change the lamp, pull out the lamp module as far as it will go. Turn the knob (2) through 180° until it snaps in place. This moves the backup lamp into the illumination beam path.
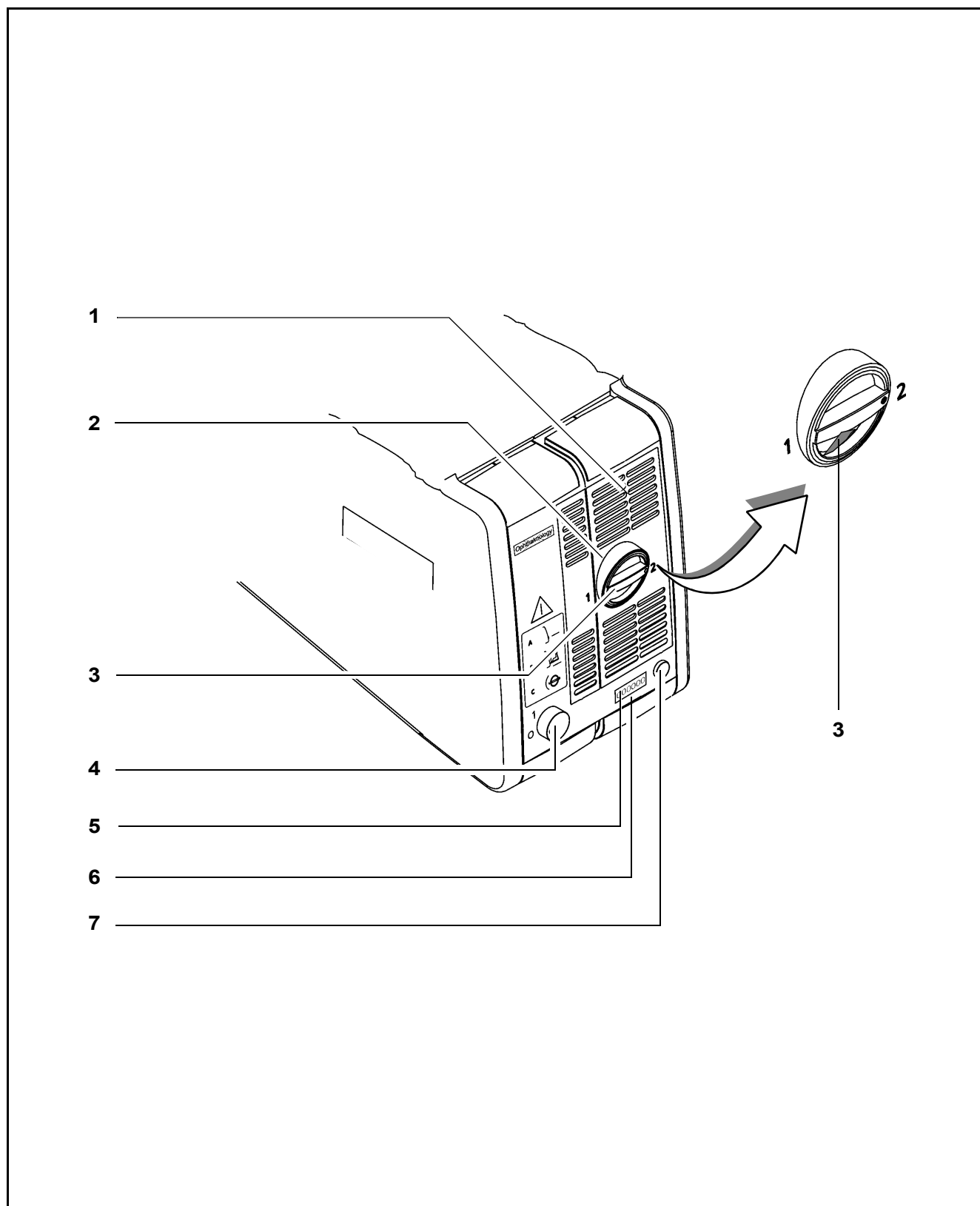
Control panel and menu overview

The control panel consists of graphic display (1) with membrane keyboard (3). All functions can be interactively controlled using menus. The display shows the selected functions and settings. Using control buttons (3) you can move through the menus and activate a selection field. The field activated is then highlighted by a dark background. Press enter button (4) to confirm your selection or entry.

For entering, briefly press any of control buttons (3). In some settings, the control buttons have a repeat function, i.e. constant pressing of a button causes the command to be repeated.

The menus are clearly laid out and user-friendly. The name of the menu is given in bar (2) at the bottom. At the right-hand end of the bar, a small pictogram is shown for quick orientation. At the left-hand end of the bar, the activation field (OK) is located. If the background of this field is dark, press the enter button to confirm your entry.

The relationship between the menus is shown in the illustration on the opposite page.

Power switch (5)
for switching the system on and off. When the system has been switched on, the green lamp in the switch is lit.
The power switch contains an automatic circuit breaker. If a short-circuit occurs, the automatic circuit breaker will respond and switch the system off.
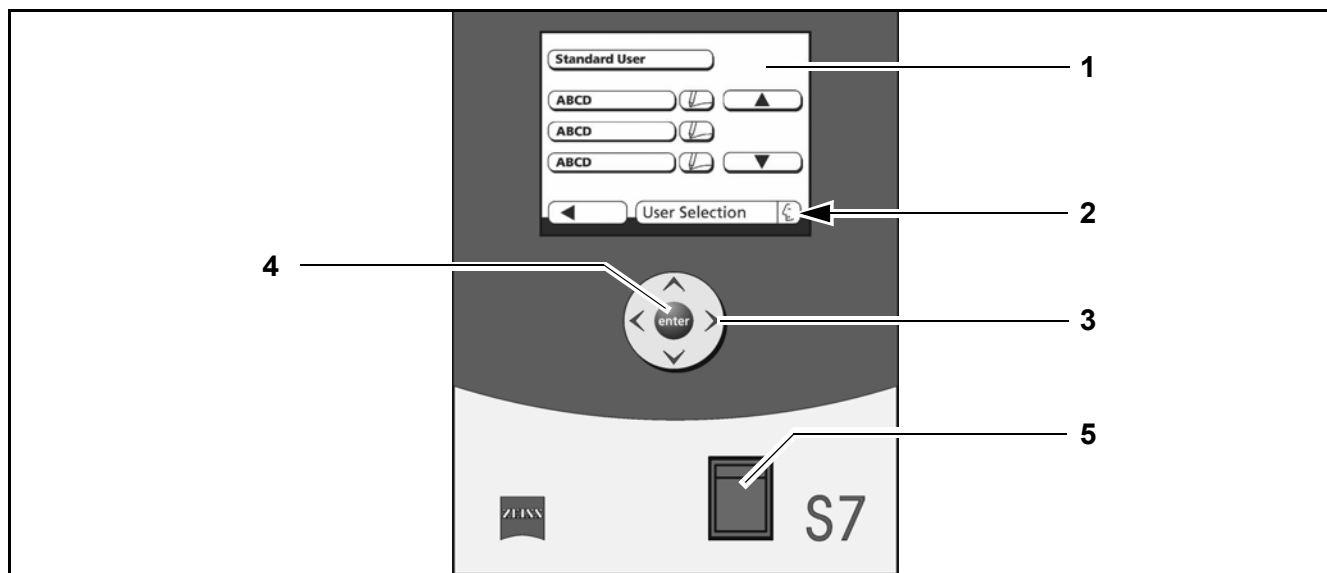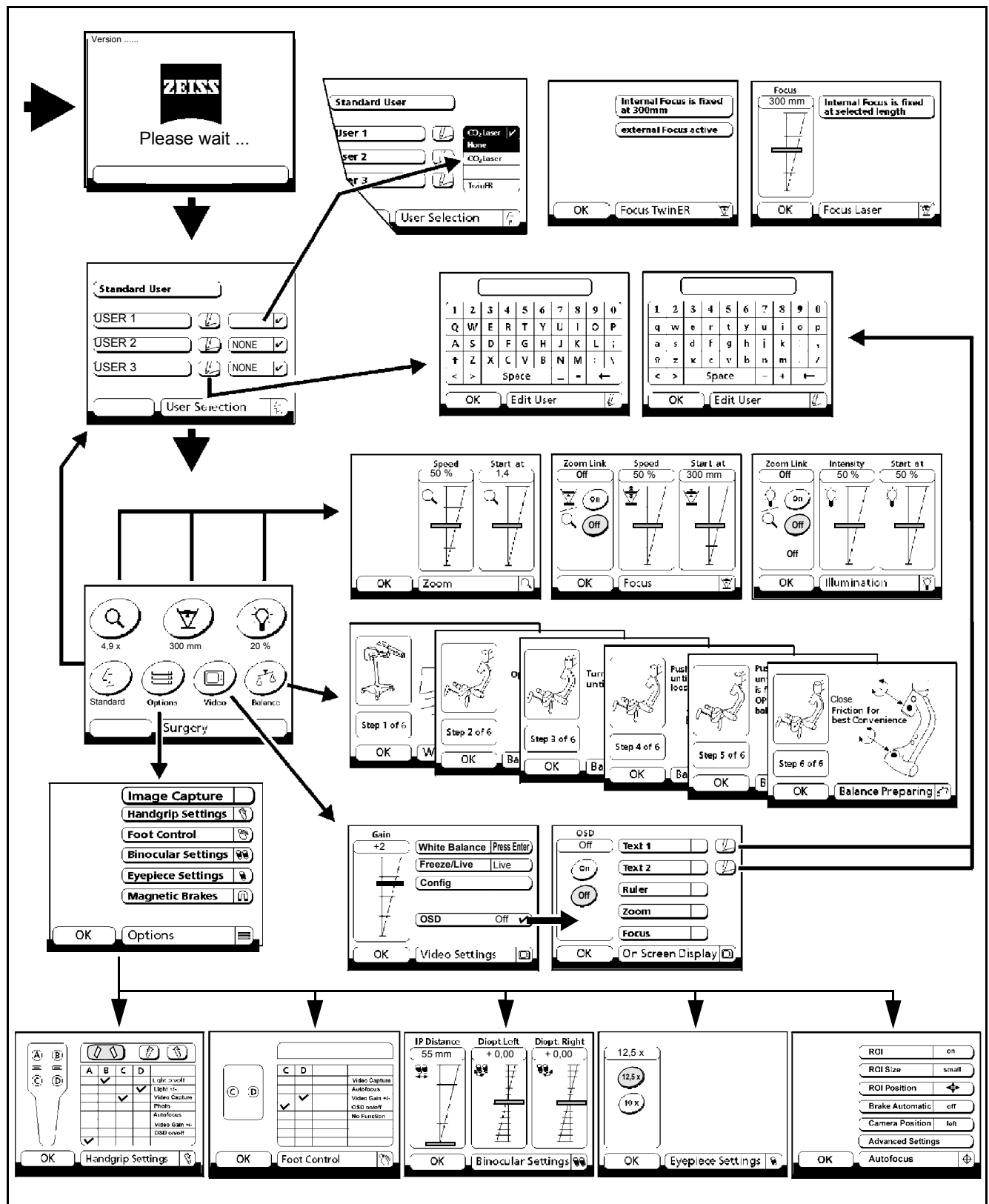
Structure of the menus

☞ Notes:
– If no entry is made for about 30 seconds, the preceding menu will automatically reappear.

– The data you have entered or changed will not be saved until you press the OK button or the enter button, or when the preceding menu appears after approx. 30 seconds because no further entries have been made.
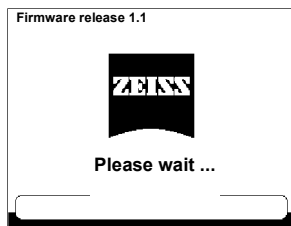
Start of menu

After you have switched on the system, the software is loaded. The growing size of the ZEISS logo indicates that this loading process is still in progress. The release number is displayed in the top left corner. The system then performs a self-test.
After successful completion of the test, the "User Selection" menu is automatically displayed.
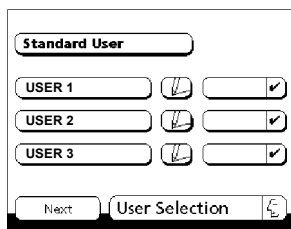
User menu

The User menu comprises one standard profile and three other user profiles.
When a user profile is selected, the system imports the settings stored under this profile, e.g. focusing speed, zoom link setting, zoom speed and handgrip settings. The stored start values ("Start at") for the magnification factor, the focus position and the brightness are automatically set. The three user profiles are used to adjust these settings for different users.

When the system is started up for the first time, the Standard User is displayed; at every subsequent start-up, the user active last is displayed.

☞ Notes:
– The Standard User profile allows the adjustment of settings, but these settings cannot be saved (fixed factory settings).

– In the Standard User profile, all "Start at" fields are deactivated. No bar is displayed; it is not possible to adjust any settings.
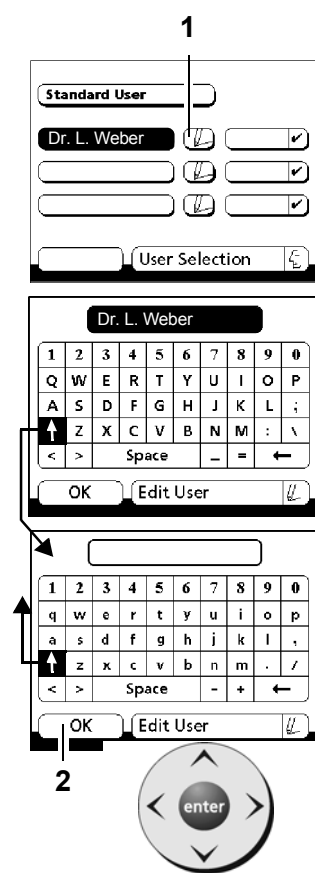
Edit User menu

Three different users or applications (e.g. larynx, nose, ear) and their profiles can be stored in the User menu. The Edit User menu allows you to enter your personal user name. When Edit icon (1) after the user name is activated, the input keyboard is displayed. This keyboard allows you to enter a 12-digit user name or application name. After entering the name, activate OK button (2) using the arrow buttons and press the enter button to save the name entered.

A user or application name is displayed in the input field. If no name has been entered, only User 1, 2 or 3 will be displayed.

After selecting a user or an application, press the enter button to return to the Surgery menu.

Functions of buttons:

– Press Edit button (1) to call the input keyboard and to activate the input function.

– Select the individual characters using the arrow buttons and accept the characters by pressing the enter button.

⬅ Delete one or more characters from right to left by pressing the enter button.

Space Space bar; press the enter button to insert a blank space .

⬆ Inverse, switches to capital letters and back again when the enter button is pressed.

< > Cursor control, for insertion or deletion of individual characters in the text.

Note:
You must activate OK button (2) using the arrow buttons and then press the enter button to save the name entered under the selected User. After selecting a user or an application, press the enter button to return to the Surgery menu.
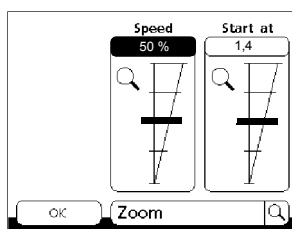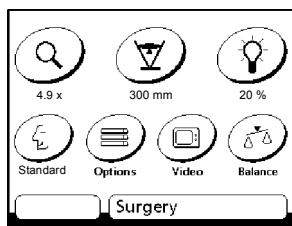
Surgery menu

The Surgery menu is constantly displayed during operation. The menu includes the icons (from left to right) for the following menus: Zoom, Focus, Illumination. Below: User, Options, Video and Balance. The displays below the zoom, focus, illumination and user icons show the current settings for total magnification, working distance, brightness level and selected User.

Note:

– The display shows the name of the user or application shortened to 10 characters.

– The readings displayed are rounded values which are only provided for information, not for measurement purposes.

Use the control buttons to activate the icon required and press the enter button to access the respective menu.

Zoom menu

You can adjust the settings for the following functions in the Zoom menu:

Speed:
The zoom speed from minimum to maximum speed from 5 % to 100 % in steps of 5 %.

Start at:
The zoom start value. Enter the magnification factor at which the zoom system should start when the system is switched on or is switched to a different user. The magnification factor can be set and stored from $\gamma = 0.4$ x to $\gamma = 2.4$x in steps of 0.1.

Note:

γ is only the magnification factor of the zoom system. The total magnification provided by the system is also determined by the eyepieces and the working distance used.

• Activate the function desired (Speed or Start at) and move the indicator bar using one of the arrow buttons ($\wedge$, $\vee$) until the reading required is displayed in the field at the top.

• Press the enter button to save the value set and to return to the Surgery menu. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds.

Note:

In the Standard User profile, all "Start at" fields are deactivated. No bar is displayed; it is not possible to adjust any settings.
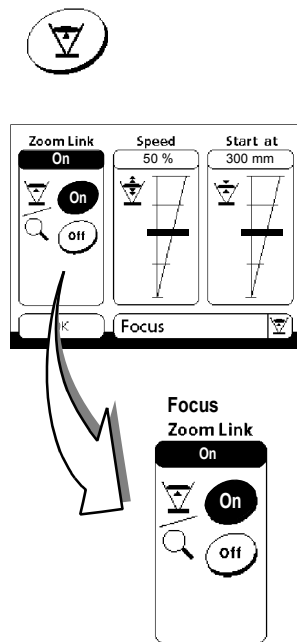
Focus menu

You can adjust the settings for the following functions in the Focus menu:

Zoom Link:
The Zoom Link function allows the focusing speed to be coupled to the current magnification. This means that the focusing speed is automatically reduced when a high magnification is used. Whether the Zoom Link function has been activated or deactivated is stored in the respective user profile.

Speed:
The focusing speed from minimum to maximum speed from 5 % to 100 % in steps of 5 %.

Start at:
Focus start value. Adjust the working distance at which the focusing system should start when you call your user profile. The setting can be adjusted and stored from 200 to 415 mm in steps of 1 mm.

- Activate the function desired and move the indicator bar using one of the arrow buttons ($\wedge$, $\vee$) until the reading required is displayed in the field at the top.

- Press the enter button to save the value set and to return to the Surgery menu. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds and save the values set.
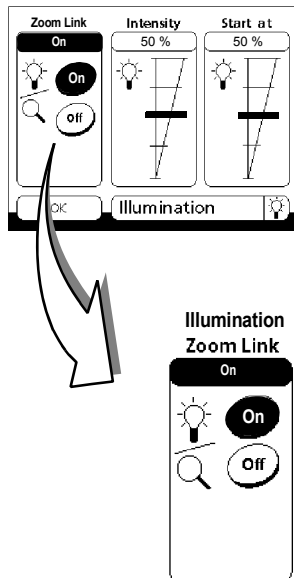
Illumination menu

You can adjust the settings for the following functions in the Illumination menu:

Intensity:
The illumination intensity from minimum to maximum brightness from 5 % to 100 % in steps of 5 %. This setting can be adjusted for the xenon illumination and the halogen illumination.

Start at:
Brightness start value. Use one of the arrow buttons ($\wedge$, $\vee$) to adjust the illumination intensity in percent. The xenon or halogen lamp will then go on at this brightness level after activation.
The "Start at" field will only be active if Zoom Link is in the Off position. If Zoom Link is On, the "Start at" field will not be active. No bar is displayed; it is not possible to adjust any settings.

Zoom Link:
Automatic brightness control. When this function is active (ON), the illumination is adjusted in such a way that the user is provided with a subjectively constant brightness level in the eyepiece, regardless of the zoom factor set. Whether the Zoom Link function has been activated or deactivated is stored in the respective user profile.

• Press the enter button to save the value set and to return to the Surgery menu. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds and save the values set.
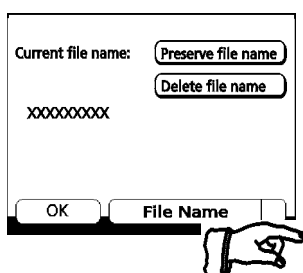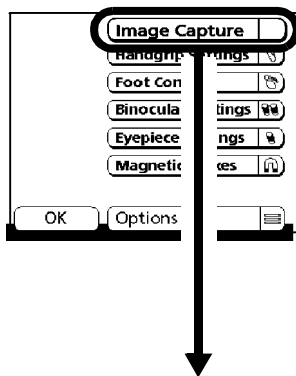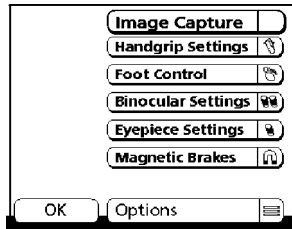
Options menu

Activate the Options icon and press the Enter button to access the Options menu. The Options menu comprises the following submenus (from the top):

– Image Capture menu

– Handgrip Settings menu

– Foot Control menu

– Binocular Settings menu

– Eyepiece Settings menu

– Autofocus menu (option)

Image Capture menu

Image Capture permits you to save, view and delete image data in the JPEG or TIFF format.

• Select the Options icon in the Surgery menu and press the Enter button.

• Select Image Capture in the Options menu and press the Enter button.

File name inquiry

The Image Capture menu permits you to assign a name to the saved image. This name is saved and remains valid until it is deleted or changed. To prevent that a wrong name is assigned to an image, the system checks whether the entered name already exists. If no name is found, the inquiry is skipped. Íf the name is found, the user is requested to specify whether the name should be retained or deleted.
If no name has been saved, the inquiry menu is not displayed.

– **Preserve file name** = the current file name is retained, the system goes to the Surgery mode.

– **Delete file name** = the file name is deleted, the system goes to the Surgery mode.

Use the cursor to select the option required, and activate it with the Enter button.

Note:
The display remains visible until an entry has been made.

Image Capture menu
Note:
The number of images that can be saved on the USB memory stick is only limited by the USB stick capacity.
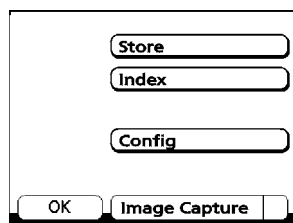
Store function

The video image currently displayed can be saved on the USB memory stick by selecting the Store option and pressing the Enter button.
For the store settings see page 146.
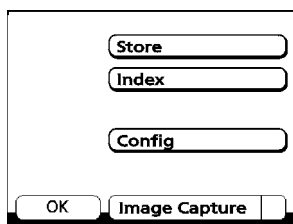
Index option

The Index option permits you to access the graphic index, where saved images are displayed in the form of 12 distortion-free, demagnified images (thumbnails) per screen page.
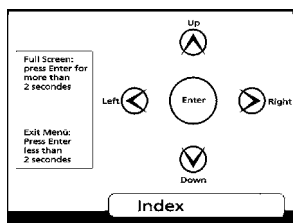
For the Index functions, see page 170.

Press the Enter button to return to the graphic index.
Press the Enter button to exit the graphic index and to switch to the live image mode.

If no images are available, the error message "No Images - Check USB Stick" is displayed.
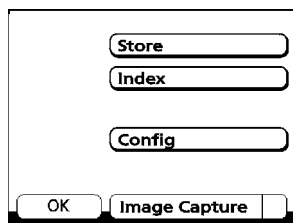
Config menu
The Config menu permits you to configure the Image Capture function.
For the Config menu see page 144.
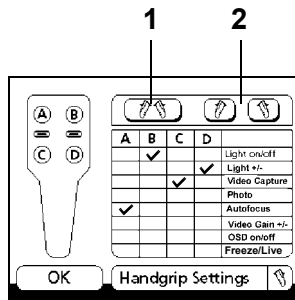
Handgrip Settings menu
This menu allows you to assign one of the listed functions to each of the four buttons (A, B, C, D) for every user or application:

– Light on/off: switching the illumination on and off.

– Light +/-: adjusting the brightness level of the illumination.

– Video Capture: triggering the device connected to the Remote socket (on the suspension system's connector panel).
If the USB option is integrated, Video Capture acts on a connected, external storage system (USB stick) and is therefore assigned the additional identification **Ext**. (Ext. Video Capture).

– Photo: triggering an electrical contact in the suspension system. Here, a camera can be connected (option).

– Autofocus: triggering the SpeedFokus autofocus option.

– Video Gain +/-: adjusting the brightness level of the integrated video system (option).

– OSD on/off: activating/deactivating the on-screen display of the integrated video system (option).

– "Freeze/Live": the current live video image is frozen and displayed as a full-screen freeze frame on the monitor.
If the USB option is present, the designation of the Freeze/Live function is Freeze/Store.

Note:
The Video Gain +/- and the OSD on/off functions are only offered for selection if your system is equipped with an integrated video camera (option). Without an integrated video camera (option), these fields remain blank.

In addition, you can either assign the same functions to both handgrips (button (1)) or assign different functions to the left and right handgrip (button (2)).

Assignment of functions:
Use the arrow buttons ($\wedge$, $\vee$) to select the function required from the table. Use the arrow buttons ($<$, $>$) to select the handgrip button required (A-D). After you have pressed the enter button, a tick ($\checkmark$) indicates that the selected function has been assigned to the selected button . When you press the enter button again, your selection is saved and you return to the Surgery menu.
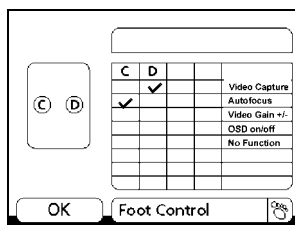
Foot Control menu
Your suspension system permits the connection of a foot control panel (option). This menu allows you to assign one of the listed functions to each of the buttons C and D on the foot control panel for every user:

– Video Capture: triggering the device connected to the Remote socket (on the suspension system's connector panel).

– Autofocus: triggering the SpeedFokus autofocus option.

– Video Gain +/-: adjusting the brightness level of the integrated video system (option).

– OSD on/off: activating/deactivating the on-screen display of the integrated video system (option).

Note:
The Video Gain +/- and the OSD on/off functions are only offered for selection if your system is equipped with an integrated video camera (option). Without an integrated video camera (option), these fields remain blank.

Assignment of functions:
Use the arrow buttons (∧ , ∨) to select the function required from the table. Use the arrow buttons (＜ , ＞) to select the button required (C or D). After you have pressed the enter button, a tick (✓) indicates that the selected function has been assigned to the selected button .
When you press the enter button again, your selection is saved and you return to the Surgery menu.
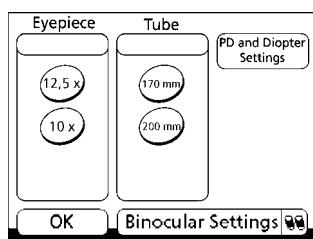
Binocular Settings menu

If you select Binocular Setting in the Options menu, the following three setting options are available:

– Selection of the eyepieces used (10x or 12.5x)

– Selection of the tube used (170 mm or 200 mm)

– Activation of the PD and Diopter Settings submenu

The selection of the tube and eyepieces is required for the correct display of the system's total magnification in the Surgery menu. Use the arrow buttons ($\wedge$, $\vee$) to select the relevant tube and eyepiece type. Save the eyepiece type and tube type used by pressing the enter button.

If you select the "PD and Diopter Settings" function, the program branches to the appropriate subprogram.

Press the enter button to save the value set and to return to the Surgery menu. If no entry is made, the display will automatically jump back to the Surgery menu after approx. 30 seconds.

PD and Diopter Settings"

This menu only has a memory function. It provides sliders which enable each user to set his/her interpupillary distance and prescription using one of the arrow buttons ($\wedge$, $\vee$) and to save these values. No motorized setting is made on the eyepieces or tube.

This function is intended to allow OR staff to adjust the surgical microscope to the surgeon's settings before the procedure and, if necessary, to retrieve or change the stored values.
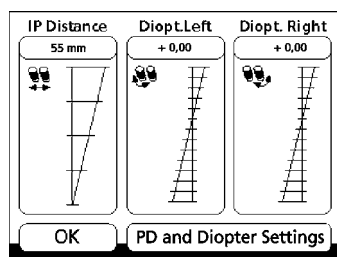
– You can set the interpupillary distance in 1 mm steps from 55 mm to 80 mm.

– When using widefield eyepieces with a magnetic coupling, you can set your prescription between -8 D and +8 D.

If no entry is made, the display will automatically jump back to the Surgery menu after approx. 30 seconds.

SpeedFokus autofocus option

The SpeedFokus autofocus option permits you to select and automatically focus on a feature in the ROI (region of interest, measuring field) in the image of the surgical field.

The SpeedFokus autofocus function is based on the evaluation of the video image contrast: during focusing of the microscope's Varioskop optics, SpeedFokus continuously determines the video image contrast in the selected ROI. In this way, SpeedFokus controls the microscope's Varioskop optics and adjusts it to the point of maximum contrast, corresponding to the point of maximum image definition.
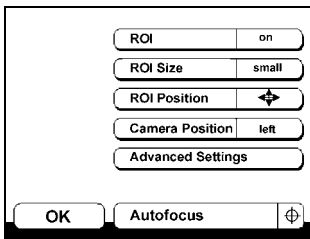
Autofocus menu

The Autofocus menu offers you the following functions for selection:

– ROI, on/off: activating / deactivating the ROI display

– ROI Size, smal/medium/large: selecting the ROI size

– ROI Position: branching to the AF - ROI Position submenu to define the ROI position

– Camera Position, left/right: entering the orientation of the external video camera.

– Advanced Settings: branching to the Advanced Settings submenu to enter the technical data of the external video camera.

Notes:

– The "Camera Position left/right" and "Advanced Settings" functions are only offered for selection if your system is equipped with an external video camera. If you have an integrated video camera, these fields remain blank.

– As long as you are entering any settings in the Autofocus menu or its submenus, the ROI is displayed as a square frame in the video image on the monitor. A few seconds after your last action, the frame disappears from the screen.

Menu item "ROI, on/off"

The position and size of the ROI are displayed on the video monitor in the form of a square frame. Use the "ROI on/off" function to activate or deactivate this display on the video monitor.

Menu item "ROI Size, small/medium/large"
Permits you to select the ROI size.
Three different ROI sizes are available for selection: small (20x20 pixels), medium (36x36 pixels) and large (50x50 pixels).
The default setting for the Standard User is the large ROI. You can change the size of the ROI, but the change cannot be saved for the Standard User.
For specific users, the ROI size can be set and saved for each user as required.
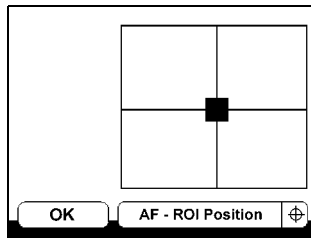
Submenu "AF - ROI Position"
This submenu permits you to define the ROI position within the microscope's field of view.

When you start the suspension system, the ROI is always positioned at the center of the field of view. The ROI is visualized as a square in the graphic display. Use the arrow keys to shift the ROI.

Press the OK button to return to the Autofocus menu. If you do not press any of the buttons, the display will automatically return to the Surgery menu after approx. 20 seconds.

Menu item "Camera Position":
If you are using an external video camera, the orientation of the video camera must be known to the SpeedFokus autofocus option.

Note:
This function is only available in systems equipped with an external video camera.

Caution:
The video image must have the same orientation as the image in the main eyepieces of the surgical microscope.
In addition, SpeedFokus needs the information whether the video camera is connected on the left or right, i.e. whether the beam splitter projects into the main beam path from the left or right, to be able to perform corrections in the right direction during the focusing process.

Submenu "Advanced Settings"
Notes:
– This submenu is only available in systems equipped with an external video camera.

– This submenu contains camera-specific settings. These settings only need to be changed when a different video camera is installed.

– The SpeekFokus autofocus option does not function properly if parameters have not been correctly set.
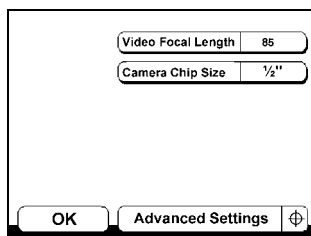
The "Advanced Settings" submenu contains the following camera-specific settings:

– Video Focal Length

– Camera Chip Size (size of the CCD array)

Video Focal Length and Camera Chip Size (size of the CCD array): These settings must conform to the technical specifications of the video camera used.
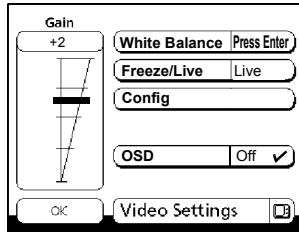
Video Settings menu (option)

The Video Settings menu permits you to configure the integrated 1CCD video camera in the Config submenu, and to enter or edit text using the OSD function.

Activate the Video icon and press the enter button to access the Video Settings menu. It contains selection fields for configuring the functions of the integrated video system.
Use arrow buttons ($\wedge$, $\vee$) to move from White Balance to → Freeze/ Live → OSD→ OK.

The function and the adjusting possibilities of the individual selection fields are explained in the following.

Gain
When you open the Video Settings menu, the Gain setting is active. Use the arrow buttons ($\wedge$, $\vee$) to adjust the brightness of the video image as required on the slider displayed.
Using the arrow button ($>$) you can jump from GAIN to the White Balance selection field.
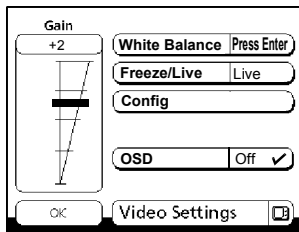
White balance
The system adjusts the video signal in such a way that white areas in the surgical field are also white in the video image.
To achieve this, place a suitable white object (e.g. a piece of white paper with a matte surface) under the microscope and focus the microscope on it, using a medium brightness level.
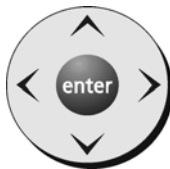
After pressing the enter button, the user is requested to place a white sheet of paper under the microscope and to start the white balance procedure by pressing the enter button.
During the white balance procedure (display: "White Balance in Process") all buttons are disabled.
After successful completion of the white balance procedure, the confirmation "White Balance OK" is displayed.
Otherwise, the monitor displays "White Balance Failed". Check the settings described above and repeat the white balance procedure.
After completion of the white balance procedures, all buttons are enabled again. The determined values are stored and are available after every restart.
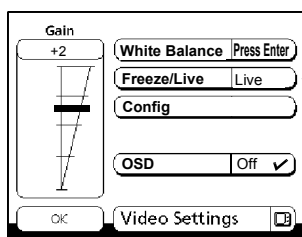
Freeze/Live setting

The freeze button permits you to freeze the current live video image and to display it as a full-screen freeze frame on the video monitor. During this time, the text "freeze" is displayed in the upper left corner.

When you press the live button, the current live video image is displayed again on the monitor, and the text "freeze" disappears.
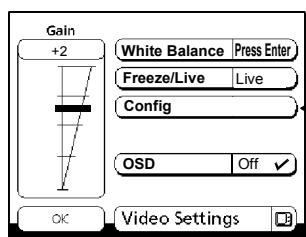
Config

The configuration menu permits you to set various functions to meet your specific needs.

You access the configuration menu by pressing the Config button.

The different setting options for the configuration of the user program are described in the chapter "Preparations for use", see page 139.

The camera is delivered with a default configuration (factory settings).
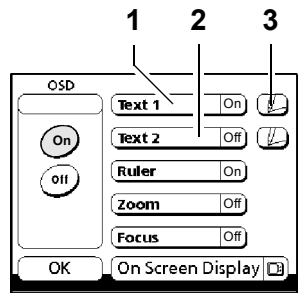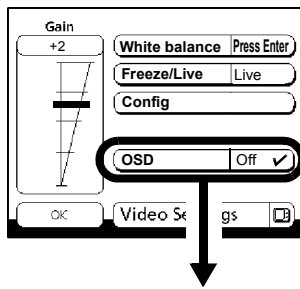
OSD menu (On Screen Display)

The OSD function allows you display freely selectable texts, a ruler and microscope parameters such as magnification and working distance on the video monitor. This information is included in the image when the screen shot is saved or printed. You can delete the individual displays by activating the corresponding selection field and selecting "Off" with the enter button. You can delete all displays from the screen by setting the OSD to "Off".

Note:
If Off has been entered for all selection fields, no display will appear even if OSD is in the ON mode.

Text fields (1) and (2) can be edited. In the Edit menu, for example, you can enter the name of the hospital and your personal user name. When you activate Edit button (3) after the text field, the input keyboard is displayed. This keyboard allows you to enter any 12-character text.

Functions of buttons:

– When the input keyboard has been activated with Edit button (3), the input function is active.

– Select the individual characters using the arrow buttons and accept the characters by pressing the enter button.

Delete one or more characters from right to left by pressing the enter button.

Space   Space bar: press the enter button to insert a blank space.

Inverse: switches to capital letters and back again when the enter button is pressed.

< >   Cursor control: for insertion or deletion of individual characters in the text.
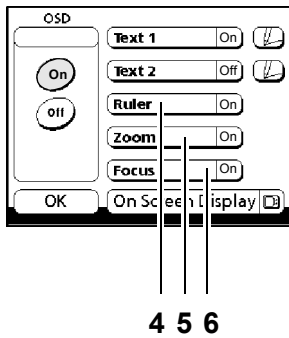
If "Ruler" selection field (4) has been activated, a ruler including a dimension is displayed in the bottom left corner of the screen. The ruler and the dimension specified automatically change with the zoom and focus settings. The numerical value of the dimension displayed can be 2.5 / 5 /10 / or 20 mm.

If "Zoom" selection field (5) has been activated, the current magnification factor of the overall system will be displayed at the bottom of the screen.

If "Focus" selection field (6) has been activated, the current working distance of the overall system will be displayed at the bottom of the screen.

Notes:

– The zoom and focus readings are identical to the readings shown on the graphic display of the control panel.

– The length of the ruler is independent of the eyepiece magnification.

– The ruler only relates to the image plane focused.

– The readings displayed are rounded values and are only provided for display and not for measuring purposes.

– The OSD ruler is no measuring instrument. It is only used to show the size ratio and must not be used for diagnostic purposes.

4 5 6

1 Hospital .....

2 Dr. ....

20 mm   3,1 x   227 mm

4   **5**   **6**
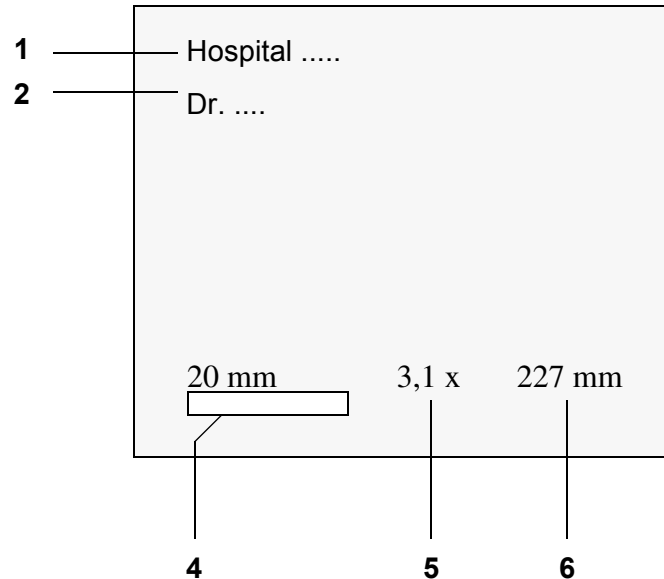
Balance menu

The Balance menu has been designed as a user prompt and consists of six images explaining the balancing procedure. You can scroll through the Balance menu using the arrow buttons (< , >). The OK button has no function.
Press the enter button or the arrow buttons (< , >) several times to return to the Surgery menu.
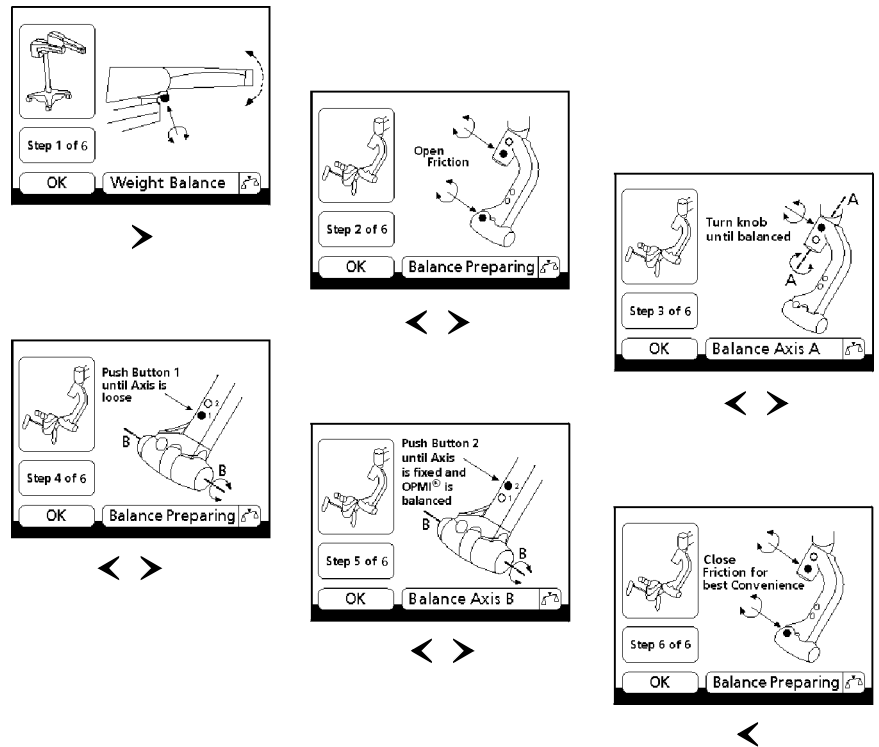
The balancing procedure is described in the "Preparations for use" chapter under "Adjusting the system"

1
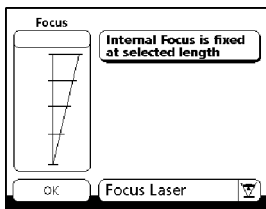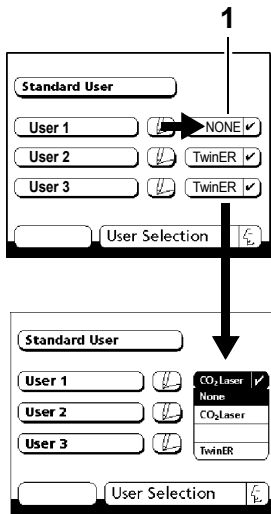
Laser menu

In the User selection menu, you can access the Laser selection menu via the respective Edit button using the arrow button ($>$). Here, the working distance (focus) of the Varioskop in the surgical microscope is adjusted to the working distance of the TwinER (option) or CO_2 laser, and the system is switched to the motorized external focus module (option) .

After you have activated Laser menu button (1), a pull-down menu is automatically opened in the display.

Note: The pull-down menu will be automatically opened if you approach from the left with the arrow button ($>$). If you select the field using the ($\wedge$, $\vee$)arrow buttons, the pull-down menu can be opened by pressing the enter button.

Using the arrow buttons ($\wedge$, $\vee$) , you can jump to $\rightarrow$ None $\rightarrow$ CO_2 Laser $\rightarrow$ TwinER.

By activating one of the options None, CO_2 Laser, TwinER and pressing the enter button, you can transfer your selection to Laser menu (1).

When you select "CO_2 Laser", you access the "Focus Laser" menu.

Use the arrow buttons ($\wedge$, $\vee$) to adjust the working distance (focus) of the micromanipulator used. After you have pressed the OK button and confirmed the user, the Varioskop is automatically adjusted to the selected working distance and deactivated. At the same time, the external focus module is activated if this option has been integrated, see also the notes on page 136.

Warning!
It is absolutely vital that the focal planes of the surgical microscope and of the laser are identical!
Check this after mounting the micromanipulator, before every surgical procedure (without patient) and before every use of the laser by directing a trial laser shot at a wooden spatula located in the focal plane. If the alignment is correct, the laser is focused precisely on the working plane, and its therapy beam displays its maximum effect. If this is not the case, you have to correct the working distance in the Laser menu.

Press the enter button to save the value set and to return to the Surgery menu. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds.

When you select "TwinER" you access the "Focus TwinER" menu (option).

The "Focus TwinER" menu only contains the displays:

– Internal Focus is fixed

– external focus active.

The Varioskop automatically adjusts to the focal length of the TwinER laser and switches off. At the same time, the external focus module becomes operative. When you press the laser micromanipulator focus switch, the external focus module is automatically activated. Any manual change of the focus triggers an error message.

This display automatically jumps back to the User menu after about 30 seconds. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds.

Malfunctions (Error message menu)

This window appears on your display when a malfunction or incorrect operation has occurred. At the same time, this is also indicated by three beeps.
In addition, the type of malfunction present and a code number are displayed in field (1).
The letters in front of the code numbers indicate the system component where the malfunction has occurred:
S - suspension system, **HR** - handgrip right, **HL** - handgrip left, **F** - foot control panel, **V** - video, **O** - surgical microscope, **C** - (core) software.

This code number permits you to identify the malfunction that has occurred,

e.g.:

HR:-9005

HANDGRIP RIGHT

handgrip button pressed

1

HR:-9005

HANDGRIP RIGHT
handgrip button pressed

Cancel

Errormessage
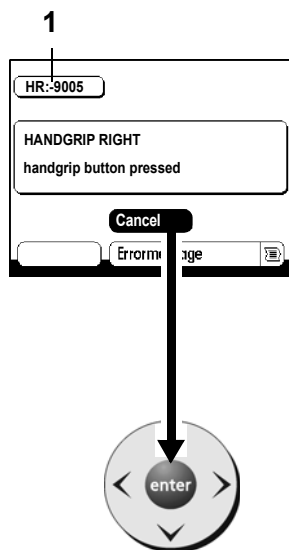
< enter >

You can delete the error message by pressing the enter button. Internally, the system keeps a record of the malfunctions occurred.

If you cannot eliminate the malfunction, you may perhaps be able to continue working by switching off the suspension system or separating the plug-in connection to the surgical microscope (see the emergency instructions on page 96).

Foot control panel (option)

Intended use

The foot control panel permits you to operate various functions of a suspension system or surgical microscope. The assignment of functions to the controls on the foot control panel is described on the next page. Only functions provided in the system configuration used (suspension system, surgical microscope) can be controlled.

Design

The foot control panels with 8 and 14 functions are equipped with two rocker switches (1) used to control the "zoom" and "focus" functions. The switches for these functions are located on one side, allowing you to control the function using toe/heel movement without having to shift your foot. Bridge (3) between two rocker switches (1) serves as a support to rest your foot on.

Connector (2) is used to connect the foot control panel to the appropriate connector on a suspension system or a wall socket.

The foot control panel is provided with a waterproof rubber cover.

The illustration shows the 14-function foot control panel. Depending on the configuration involved, an 8-function foot control panel can also be connected.
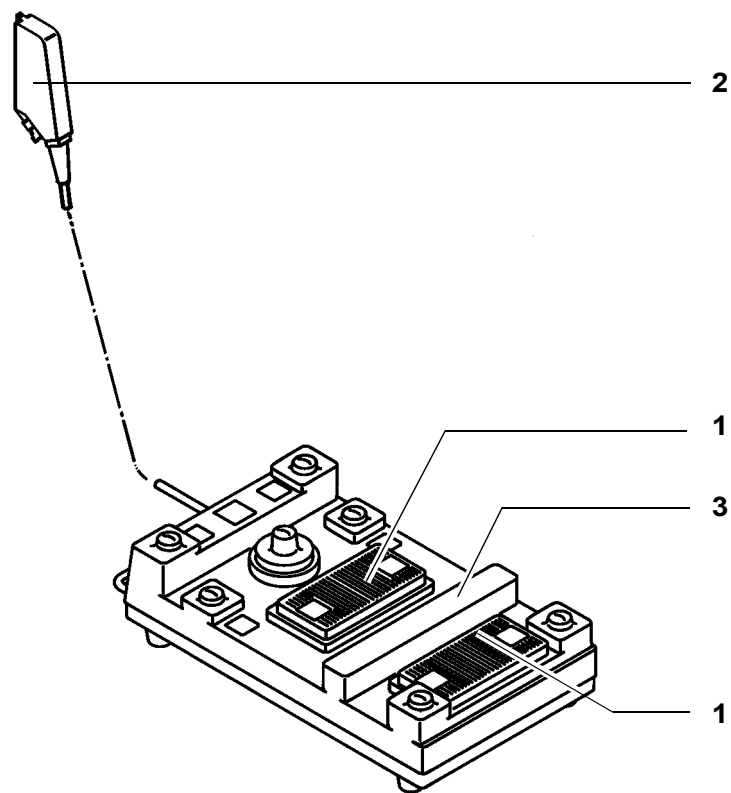
Foot control panel with 14 functions

The illustration shows the standard assignment of functions to the foot control panel with 14 functions. The focus/zoom assignment can be changed by our service staff, on request.

1   No function

2   Button A: reducing the lamp brightness

3   Button C: function as assigned in the Options menu

4   ZOOM ▼ : reducing magnification, increasing the field of view (alternatively FOCUS ▲ : increasing the working distance)

5   ZOOM ▲ : increasing magnification, reducing the field of view

6   Illumination on/off

7   Illumination on/off

8   FOCUS ▲ : increasing the working distance (alternatively ZOOM ▼ : reducing magnification, increasing the field of view)

9   FOCUS ▼ : reducing the working distance

10 Button D: function as assigned in the Options menu

11 Button B: increasing the lamp brightness
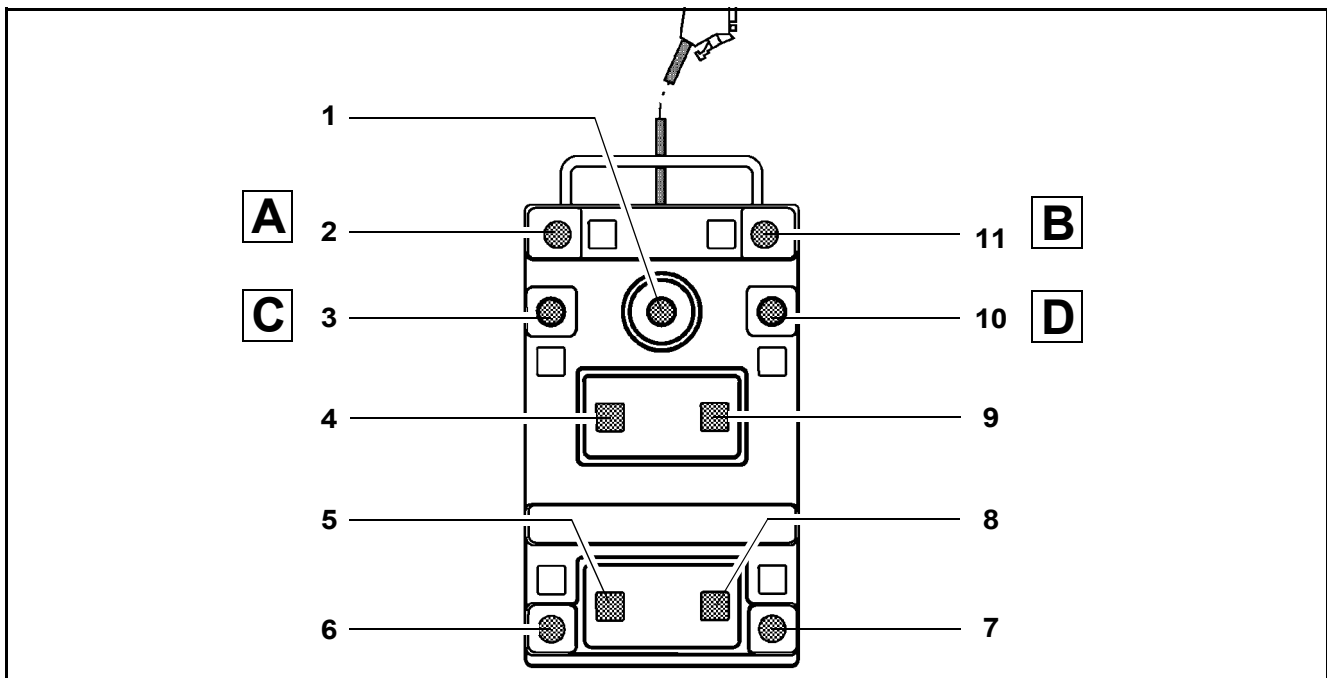
Foot control panel with 8 functions

The illustration shows the standard assignment of functions to the foot control panel with 8 functions.
The focus/zoom assignment can be changed by our service staff, on request.

1 Reducing the lamp brightness

2 No function

3 ZOOM ▼ : Reducing magnification, increasing the field of view (alternatively FOCUS ▲ : Increasing the working distance)

4 ZOOM ▲ : Increasing magnification, reducing the field of view

5 Button C: Function as assigned in the Options menu

6 Button D: Function as assigned in the Options menu

7 FOCUS ▲ : Increasing the working distance (alternatively ZOOM ▼ : Reducing magnification, increasing the field of view)

8 FOCUS ▼ : Reducing the working distance

9 No function

10 Increasing the lamp brightness
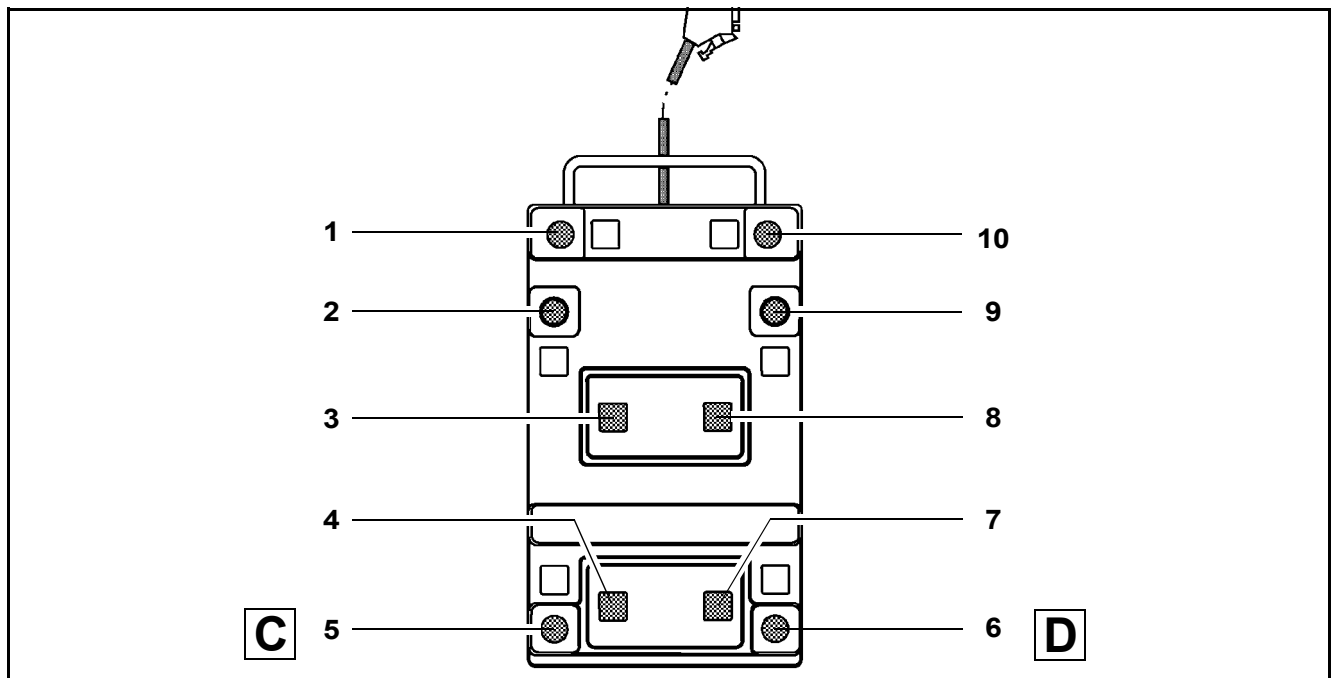
Preparations for use

Attaching the equipment

Mounting the tube and eyepieces

- Bring the suspension arm in a position convenient for you and tighten friction adjustment knob (1).

Note:
- Give securing screw (3) a few turns to loosen it.

- Remove cover (2) and store it in a safe place.

- Place binocular tube (4) on the microscope body and <u>firmly</u> tighten securing screw (3).

- You can install other units between the binocular tube and the microscope body. Lock these units in position in the same way using securing screw (3).

- Insert widefield eyepieces (6) as far as they will go in mounts (5) intended for them in the binocular tube. The magnetic coupling reliably secures them in position.

Note:
If you wish to use documentation equipment, we can supply an eyepiece with a reticle to aid focusing. The retrofitting of a reticle to an eyepiece can only be performed in the factory or by our service staff. Always install the eyepiece with the reticle in the binocular tube on the same side as the documentation equipment.

Caution:

– Before every use and after re-equipping the instrument, make sure that binocular tube (5) is securely locked in position. Make sure that securing screws (2) and (4) have been <u>firmly</u> tightened!

– Re-adjust the balance of the suspension arm after every change of the equipment.
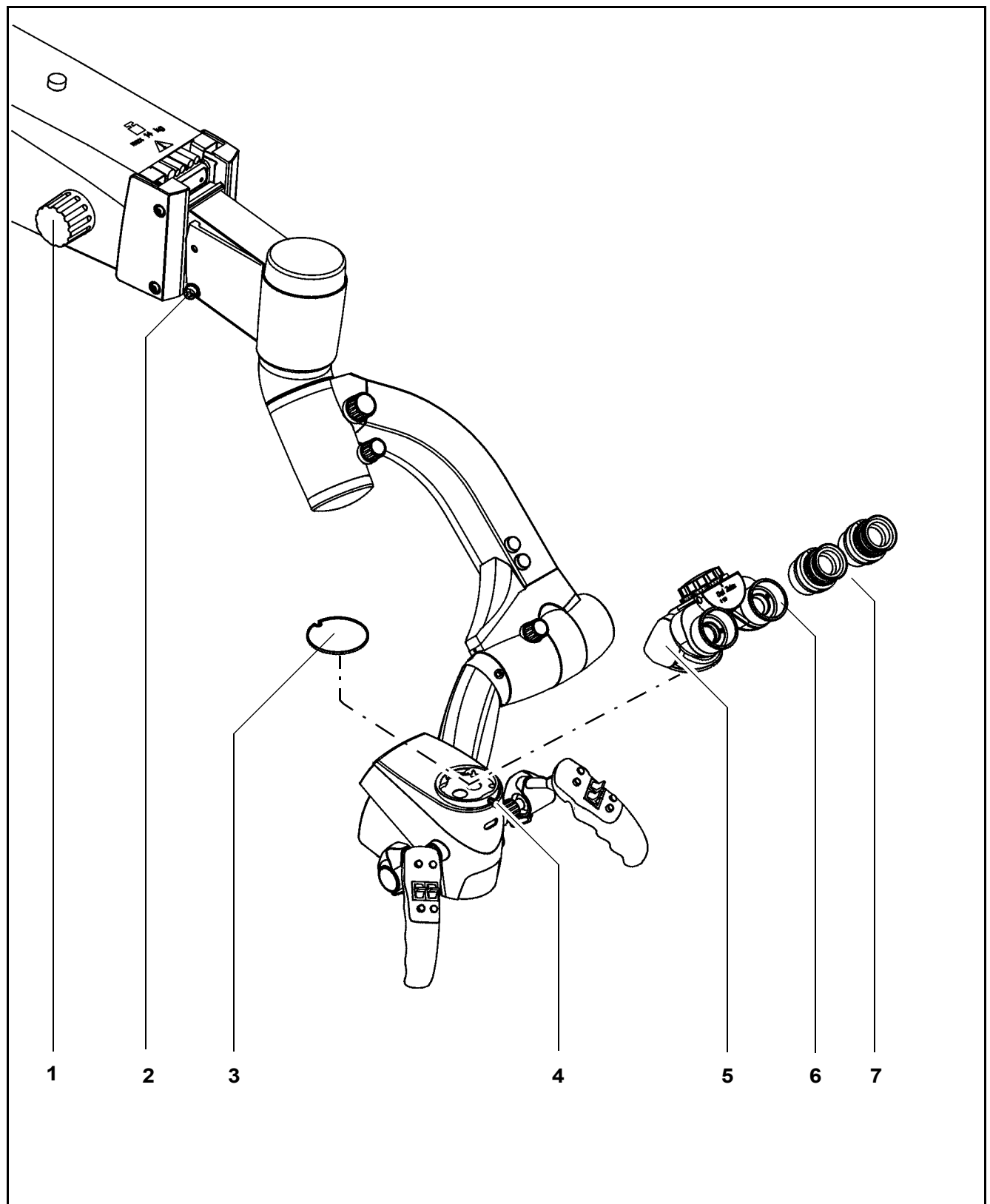
Connections

Connecting the strain relief device

Note:
You can secure the power plug and the multipoint connector of the switching component against inadvertent loosening by installing the two cables in strain relief device (1).

After you have mounted strain relief device (1), the cables must have the following lengths:

– 320 mm from the strain relief device up to and including power connector (9).

– 320 mm from the strain relief device up to connector (10) of the foot control panel.

• Form a loop with the cable as shown in (3).

• Open flap (4).

• Feed the cable through opening (5).

• Close flap (6).

• Tighten the cable until it encloses flap (7).

• Check the length of the cable.

320 mm
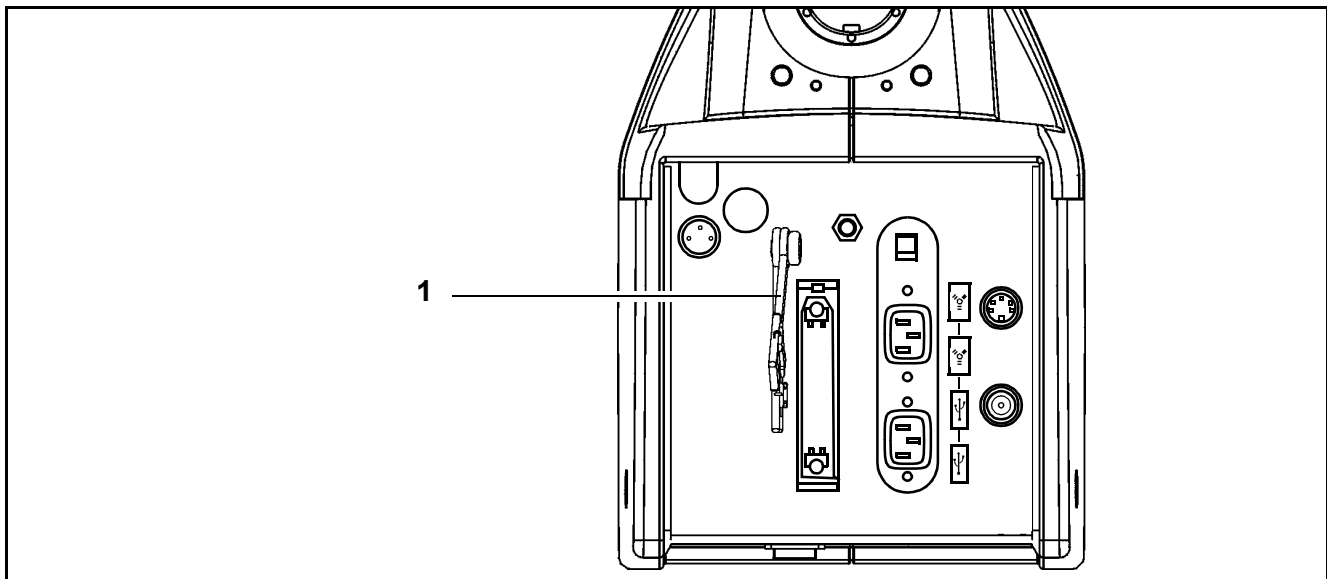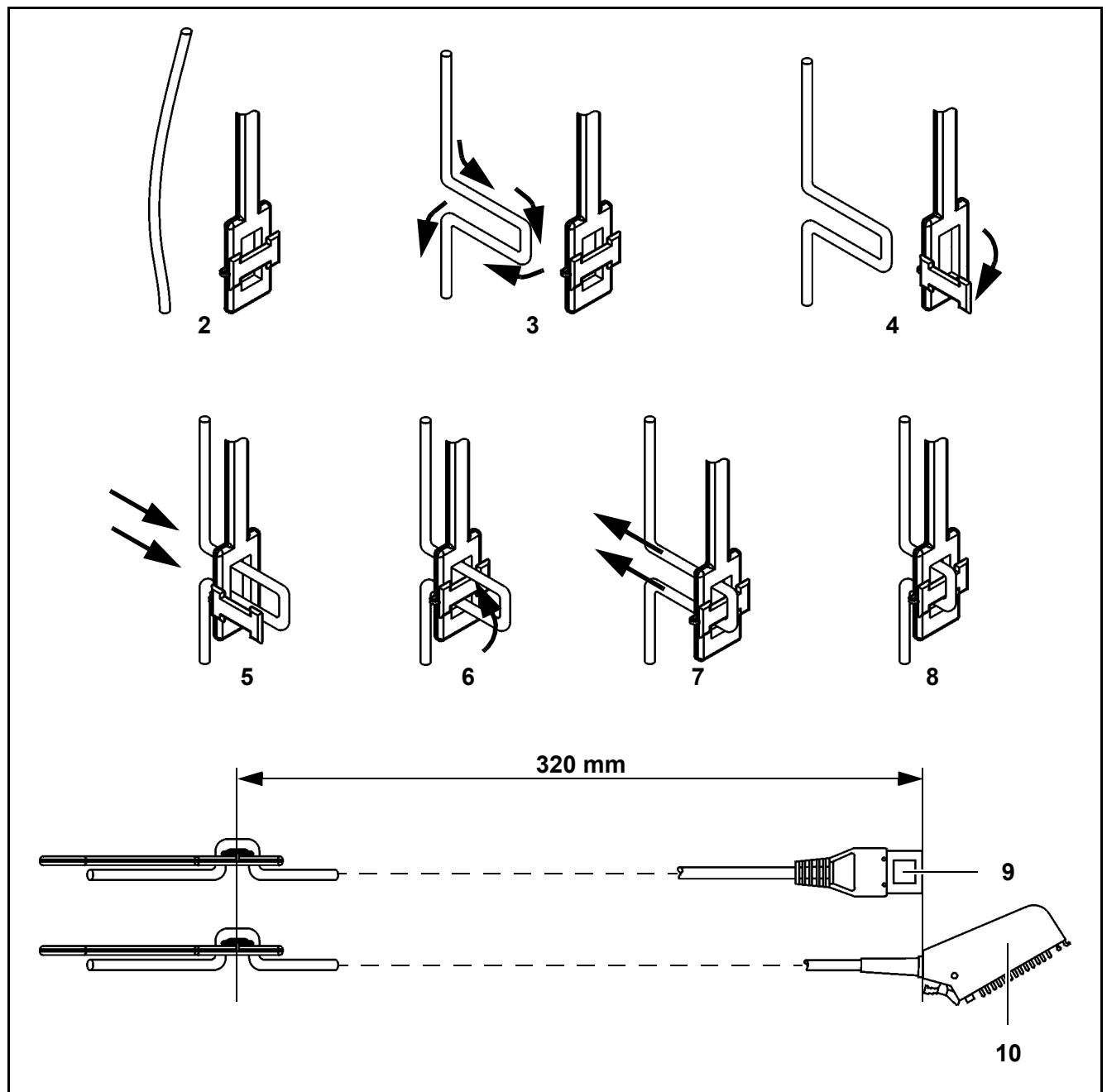
Connecting the suspension system - S7 floor stand

- Check the voltage indicated at (5).

Caution:
The voltage of the stand is factory-set to the rated voltage used in the country of destination. The rated voltage indicated at window (5) must correspond to the rated voltage available at the site of installation. If this is not the case, re-adjust the sliding switch using a suitable tool.

Note:
Make sure that the unit has been switched off at the power switch before plugging in or unplugging connectors at (3) and (4).

- Plug the connector of the foot control panel into connector (2) on the stand if you wish to use a foot control panel.

- Connect the stand to line power by plugging the power cord supplied for this purpose into (4). Only use power outlets which are provided with a properly connected protective ground contact.

- If required, connect the stand to the potential equalization contact in the OR using potential equalization pin (1).

1   2   3   4   5
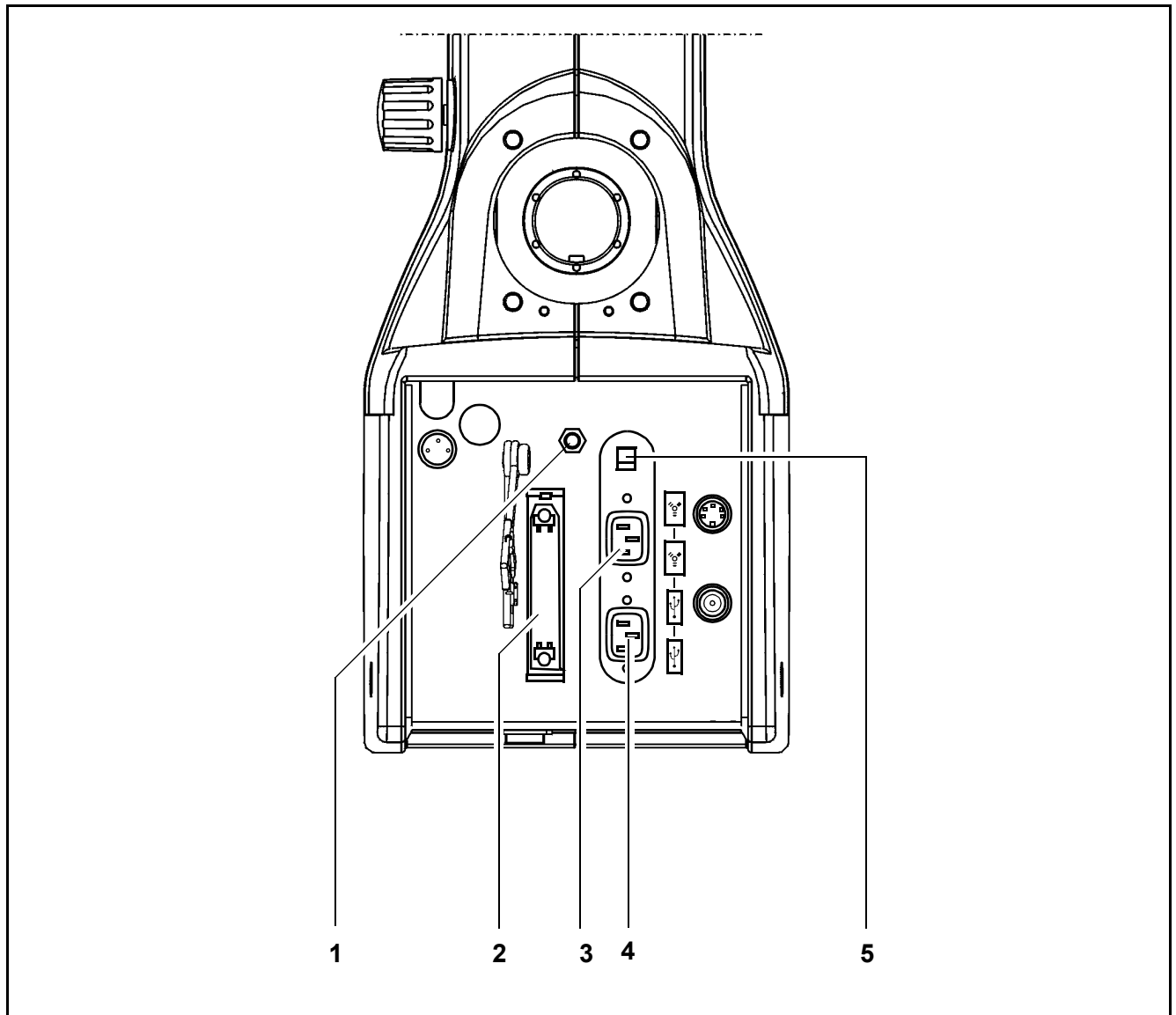
Connecting the suspension system - S7 ceiling mount with rigid column

• Check the voltage indicated at (2).

[!]

Caution:
The voltage of the suspension system is factory-set to the rated voltage used in the country of destination. The rated voltage indicated at window (2) must correspond to the rated voltage available on the site of installation. If this is not the case, re-adjust the sliding switch using a suitable tool.

• Plug the connector of the foot control panel (option) into connector (1) of the suspension system.

1   2

Connecting the suspension system - S7 ceiling mount with lifting column

• Check the voltage indicated at (2).

> **!**
>
> **Caution:**
> The voltage of the suspension system is factory-set to the rated voltage used in the country of destination. The rated voltage indicated at window (2) must correspond to the rated voltage available on the site of installation. If this is not the case, re-adjust the sliding switch using a suitable tool.

• Plug the connector of the foot control panel (option) into connector (1) of the suspension system.

1　　　　　　　**2**

OPMI® Sensera on S7 Suspension Systems

Connecting video monitor and MediLive ImageBox (option)

Note:
The image quality obtained with Y/C connections and cables shorter than 10 m is always better than that obtained with BNC connections of the same length. If cable lengths exceed 10 m, the image quality provided by a Y/C connection will decrease markedly; in these cases, only BNC connections should be used.

For this reason, position the individual units in such a way that you can use Y / C connections. The Y/C connection provides the best image quality, in particular for images recorded with the MediLive ImageBox.
If this is not possible, position the individual units in such a way that you can use the Y/C cable at least for the video input port on the MediLive ImageBox.

Remote control of the MediLive ImageBox using freely configurable buttons

The freely configurable handgrip buttons of the surgical microscope and the freely configurable keys (C and D) on the foot control panel allow you to control external units.

The signal generated by the configurable buttons/keys is present at the Remote socket on the connector panel of the suspension system.

• To enable the remote control function, connect the Remote socket on the connector panel of the suspension system to the Remote socket on the MediLive ImageBox.

Design

1 Commercial video monitor

2 Commercial video recorders, video printers, video projectors

3 MediLive ImageBox

4 Connector panel of the suspension system

(Option)

VIDEO IN

VIDEO IN

BNC(FBAS)

Y/C

BNC(FBAS)

Y/C

MediLive ImageBox

Remote
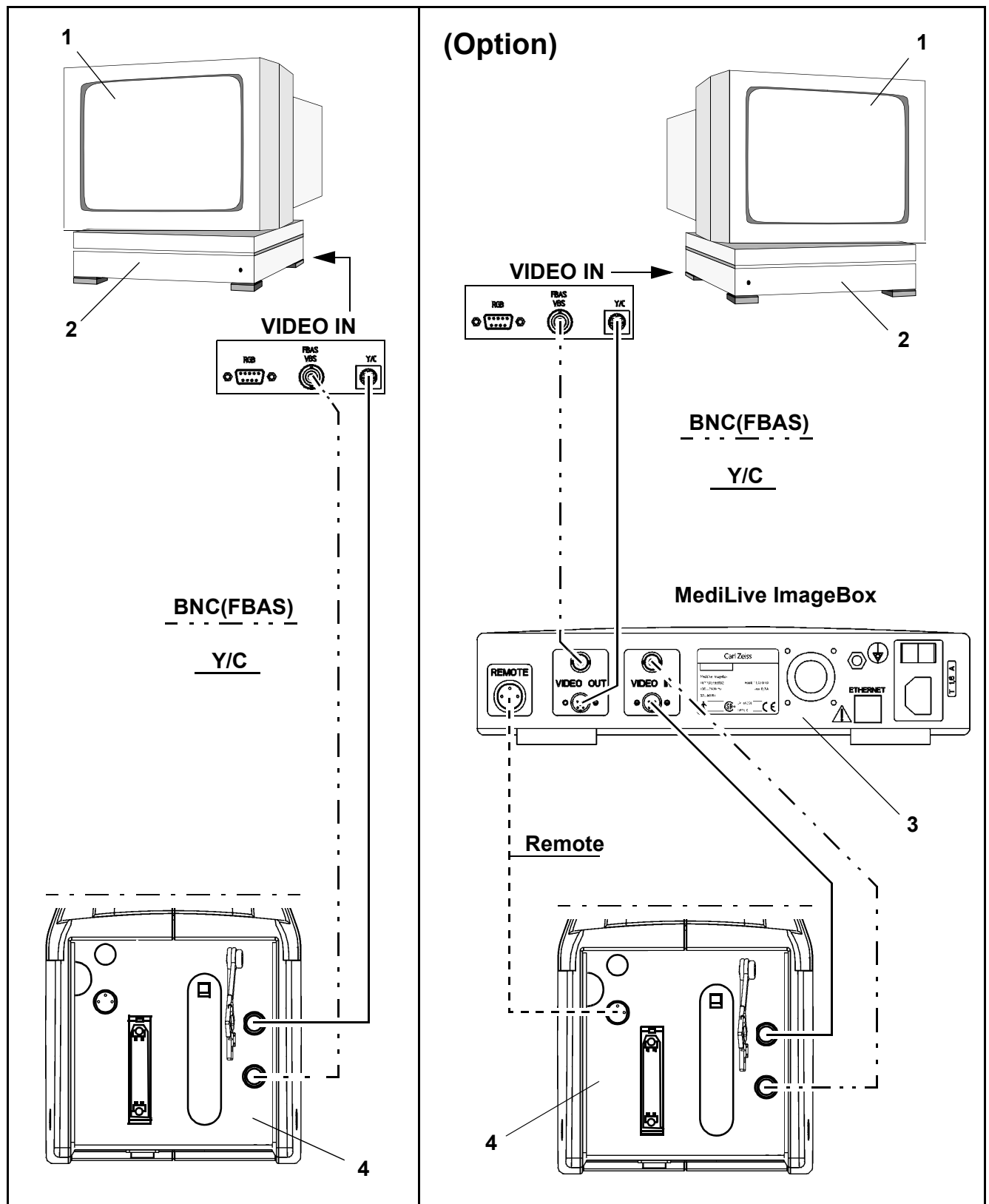
Adjusting the system - S7 floor stand

Balancing the suspension arm

Note:
Do not perform the balance setting until the surgical microscope and all accessories have been mounted!

- Move the suspension arm into its horizontal position and tightly hold it with one hand.

- Loosen knob (3) for adjusting the friction of the suspension arm's upward/downward movement.

- Move the suspension arm slightly up and down. At the same time, turn adjustment screw (1) until you think that the spring force is sufficient to compensate for the weight of the surgical microscope and accessories. Continue to perform this adjustment until the surgical microscope moves neither upward nor downward. The surgical microscope is fully balanced when it remains stationary in all positions within the work area.

Note:
Turning the screw clockwise increases the spring force, turning it counterclockwise reduces the spring force.

Setting the limit of downward travel of the suspension arm

Warning!
The downward travel of the suspension arm must be limited in such a way that the microscope cannot come into contact with the patient even if the surgical microscope is inadvertently lowered.

- Loosen locking lever (2) for the upward/downward movement.

- Lower the surgical microscope until it can be focused on the surgical field (depending on the focal length of the objective lens), while at the same time allowing for a sufficient safety distance from the surgical field.

- Firmly retighten locking lever (2) for the upward/downward movement.

• Lower the surgical microscope again to its bottom stop and check the safety distance.

Notes:

– The limit of downward travel is only effective in the lower part of the suspension arm's range of vertical movement (starting from the arm's horizontal position).

– If you wish to use the suspension arm's full range of vertical movement, lower the suspension arm as far as it will go and then firmly retighten locking lever (2).

1   2   3

Adjusting the system - S7 ceiling mount with rigid column

Balancing the suspension arm

Note:
Do not perform the balance setting until the surgical microscope and all accessories have been mounted!

- Move the suspension arm into its horizontal position and tightly hold it with one hand.

- Loosen knob (3) for adjusting the friction of the suspension arm's upward/downward movement.

- Move the suspension arm slightly up and down. At the same time, turn adjustment screw (1) until you think that the spring force is sufficient to compensate for the weight of the surgical microscope and accessories. Continue to perform this adjustment until the surgical microscope moves neither upward nor downward. The surgical microscope is fully balanced when it remains stationary in all positions within the work area.

Note:
Turning the screw clockwise increases the spring force, turning it counter-clockwise reduces the spring force.

Setting the limit of downward travel of the suspension arm

Warning!
The downward travel of the suspension arm must be limited in such a way that the microscope cannot come into contact with the patient even if the surgical microscope is inadvertently lowered.

- Loosen locking lever (2) for the upward/downward movement.

- Lower the surgical microscope until it can be focused on the surgical field (depending on the focal length of the objective lens), while at the same time allowing for a sufficient safety distance from the surgical field.

- Firmly retighten locking lever (2) for the upward/downward movement.

• Lower the surgical microscope again to its bottom stop and check the safety distance.

Notes:
– The limit of downward travel is only effective in the lower part of the suspension arm's range of vertical movement (starting from the arm's horizontal position).

– If you wish to use the suspension arm's full range of vertical movement, lower the suspension arm as far as it will go and then firmly retighten locking lever (2).

1   2   3

Adjusting the system - S7 ceiling mount with lifting column

Setting an ergonomic working height

Bring the surgical microscope into a position convenient for you before each surgical procedure, and set the optimum ergonomic working height of the suspension system via the lifting column (without patient!).

As long as you keep selector switch (2) in the turned position, lifting column (1) moves upward or downward, depending on the switch position. When you release the selector switch, the lifting column stops immediately.

• Before raising or lowering the suspension system, make sure that there is sufficient clearance from other objects so that any collision is avoided.

Note:
The lifting column is used to move the microscope into position for surgery prior to the surgical procedure.
Do not constantly move the lifting column up and down, since a thermal cut-out will then automatically deactivate the drive motor. If this occurs, the lifting column cannot be moved until the motor has cooled down.

Warning!

– Do <u>not</u> activate the lifting column during surgery!

– Do <u>not</u> use the lifting column for focusing.

– Make sure that the patient is <u>not</u> put at risk or injured by the motorized adjustment of the lifting column.
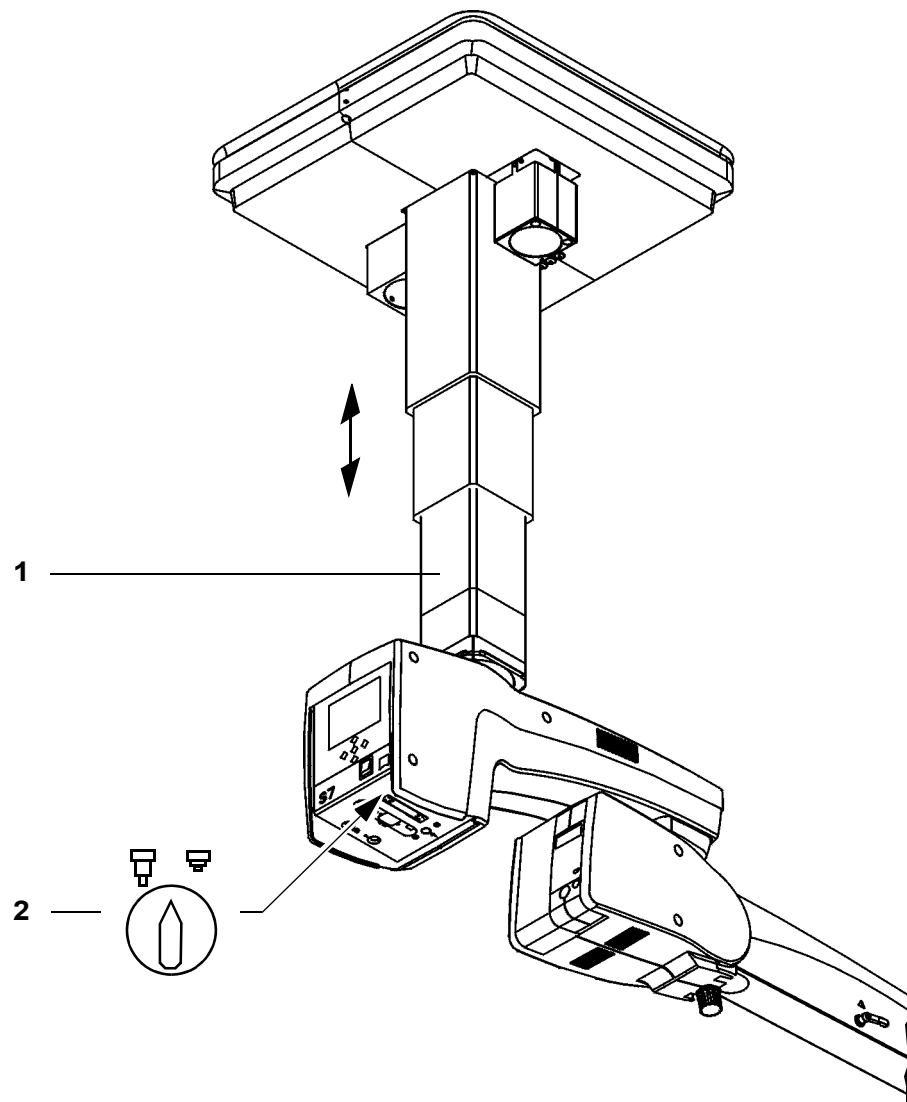
Balancing the suspension arm (ceiling mount with lifting column)

Note:
Do not perform the balance setting until the surgical microscope and all accessories have been mounted!

- Move the suspension arm into its horizontal position and tightly hold it with one hand.

- Loosen knob (3) for adjusting the friction of the suspension arm's upward/downward movement.

- Move the suspension arm slightly up and down. At the same time, turn adjustment screw (1) until you think that the spring force is sufficient to compensate for the weight of the surgical microscope and accessories. Continue to perform this adjustment until the surgical microscope moves neither upward nor downward. The surgical microscope is fully balanced when it remains stationary in all positions within the work area.

Note:
Turning the screw clockwise increases the spring force, turning it counterclockwise reduces the spring force.

Setting the limit of downward travel of the suspension arm

Warning!
The downward travel of the suspension arm must be limited in such a way that the microscope cannot come into contact with the patient even if the surgical microscope is inadvertently lowered.

- Loosen locking lever (2) for the upward/downward movement.

- Lower the surgical microscope until it can be focused on the surgical field (depending on the focal length of the objective lens), while at the same time allowing for a sufficient safety distance from the surgical field.

- Firmly retighten locking lever (2) for the upward/downward movement.

- Lower the surgical microscope again to its bottom stop and check the safety distance.

Notes:
– The limit of downward travel is only effective in the lower part of the suspension arm's range of vertical movement (starting from the arm's horizontal position).

– If you wish to use the suspension arm's full range of vertical movement, lower the suspension arm as far as it will go and then firmly retighten locking lever (2).

1   2   3

Balancing the surgical microscope

⚠️ **Warning!**
Balance the completely equipped surgical microscope <u>before</u> surgery <u>without</u> the patient.

To permit almost effortless guidance of the surgical microscope, the surgical microscope and the suspension system used must be correctly balanced. If the system is in an extremely unbalanced state, the unit can move uncontrollably out of position. For this reason, hold the surgical microscope tightly at its handgrips before loosening the friction adjustment knob on the suspension arm.

Adjusting the friction of the microscope's axis of rotation

• Use knob (1) to adjust the friction of the microscope's axis of rotation.

Adjusting the lateral tilt motion

• Loosen friction adjustment knob (3).

• Use knob (2) to adjust the spring force in such a way that the surgical microscope is balanced about its lateral tilt axis and remains stationary in the viewing direction required.

   – If the surgical microscope tends to move clockwise, turn knob (2) counterclockwise.

   – If the surgical microscope tends to move counterclockwise, turn knob (2) clockwise.

Adjusting the friction of the lateral tilt axis

• Use knob (3) to adjust the friction for the lateral tilt axis as required.

1

2

3
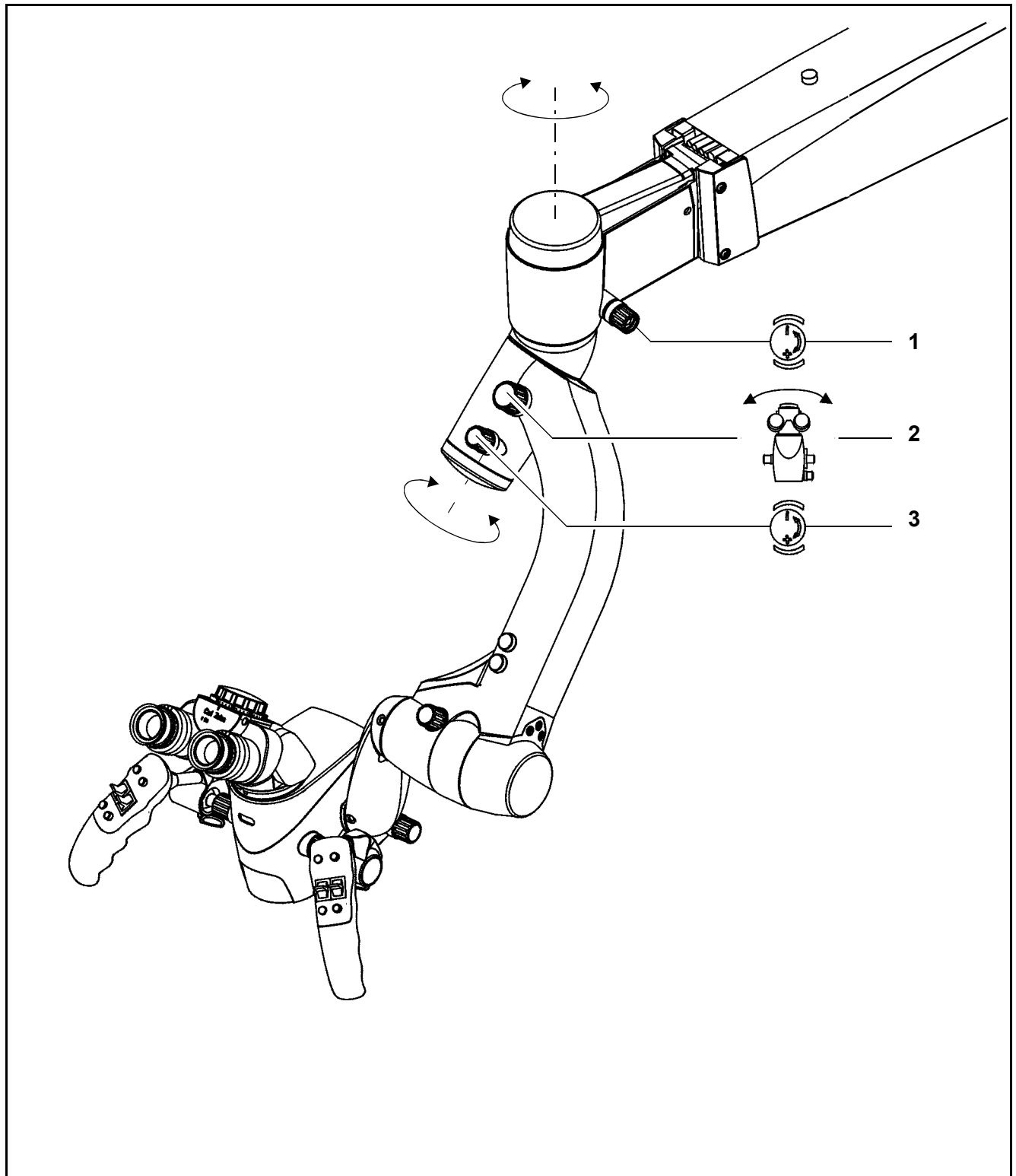
Balancing the front-to-back tilt motion

For initial balancing or after a change of the accessories, proceed as follows:

Warning!
If the system is in an extremely unbalanced state, the unit can move uncontrollably out of position. For this reason, hold the surgical microscope tightly at its handgrips before loosening the friction knob.

• Loosen friction knob (4).

Zero position

• Press button (1) until the motor of the balancing system stops. This decouples the microscope body from its mount.
The microscope has been decoupled from its suspension and has adopted its center-of-gravity position (zero position) if the white ring with marking (3) does not move when you turn the microscope.

• Please check that the white ring is really in the zero position. If this is not the case, turn it manually to the zero position.

• Press button (2).
Important: Allow the microscope to hang in its center-of-gravity position while you press button (2).

After approx. 15 seconds, the microscope body has again been coupled on its suspension. You can check this: When you move the microscope body, white ring (3) also moves.

• Continue pressing key (2) and check whether the microscope body remains balanced in every tilt position. Depending on the accessories attached, this can take some time (approx. 1 minute or longer). To check this, slightly lift the microscope body and tilt it into different positions to see whether the microscope body has been correctly balanced.

• If you have pressed button (2) for too long, you can correct the balance by pressing button (1).

Correcting the balance of the front-to-back tilt motion

After a slight change in the position of accessories (e.g. the angle of the coobservation tube) it may become necessary to correct the balance setting.

– If the microscope body tends to tilt forward (in your direction), press key (2).

– If the microscope body tends to tilt backward, press key (1).

Adjusting the friction of the front-to-back tilt axis

Use knob (4) to adjust the friction of the front-to-back tilt axis as required.
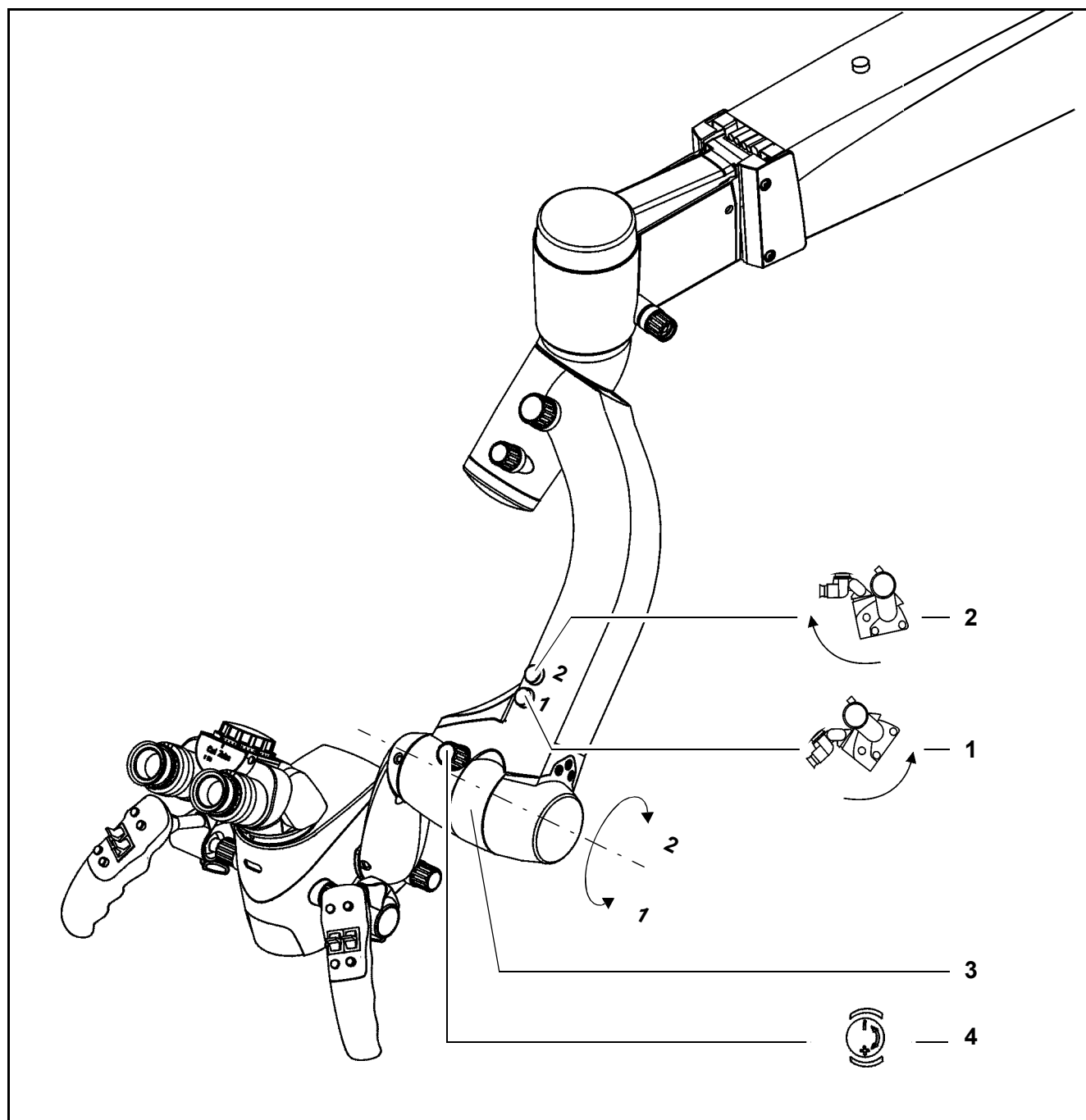
Surgical microscope with a laser micromanipulator

- Please observe the separate user manual for your micromanipulator.

Before using the surgical microscope with a laser micromanipulator, you must adjust the focal plane of the microscope (Varioskop) to the focal plane of the micromanipulator.

Note:
The focal plane roughly corresponds to the working distance.

In the User selection menu, you can access the Laser selection menu via the respective Edit button using the arrow button (❯) (see chapter: Description/Laser menu/CO_2laser).

- Use the arrow buttons (∧ , ∨) to adjust the working distance (focus) of the Varioskop in the surgical microscope to the working distance of your micromanipulator.

If the motorized fine focus (available as an option) has been integrated, the motorized focusing function of the Varioskop automatically switches to the fine focus mode. When the focusing buttons on the handgrip are pressed, the complete surgical microscope including the micromanipulator is moved. This ensures that the surgical microscope and the micromanipulator remain focused on the same focal plane. Any manual change of the focus triggers an error message.

Warning!
It is absolutely vital that the focal planes of the surgical microscope and of the laser are identical!
Check this after mounting the micromanipulator, before every surgical procedure (without patient) and before every use of the laser.

- Set the microscope to maximum magnification.

- Hold a wooden spatula in the focal plane in such a way that you see it sharply focused.

- Trigger a few trial shots of the laser at the spatula, slightly changing the spatula position (relative to the focal plane) for each shot.

  The therapy beam of the laser displays its maximum effect in the focal plane of the micromanipulator. The wooden spatula must be sharply focused in this position. Only then will the two focal planes coincide.
  If this is not the case, refocus and correct the working distance in the Laser selection menu.

- Repeat the test until full coincidence of the focal planes has been obtained.

The link-up of a micromanipulator with the OPMI via the adapter plate results in a medical system for which the system manufacturer must meet the necessary requirements (approval, qualification, laser protection, etc.) Please note the user manuals provided by the micromanipulator manufacturer and laser manufacturer. Further information is available from our service department or from authorized representatives.

Adjusting the surgical microscope

Bring the surgical microscope into its starting position within the focusing range. Adjust the minimum magnification on the surgical microscope. Bring the surgical microscope into the position required. Adjust your interpupillary distance on the binocular tube. Adjust your prescription on the eyepieces. Please note that instrument myopia may occur.

Eyepieces without reticle:

Eyepieces with reticle:

Emmetropes
adjust the diopter scale to 0 diopter (D).

Eyeglass wearers
(who perform surgery wearing their eyeglasses) adjust the diopter scale to 0 diopter (D).

Ametropes
(who know their prescription and perform surgery without wearing their glasses) adjust the diopter scale to their prescription.

Ametropes (who do not know their prescription and perform surgery without wearing their glasses)

Adjust both eyepieces on the main microscope to +5 D.
Adjust both eyepieces on the assistant's microscope to +5 D (if applicable).

Remove the binocular tube and the eyepieces from the microscope body and point them at a distant object[*], i.e. use them like a pair of binoculars. The image of the object is still unsharp.

Turn the diopter scale of one eyepiece slowly clockwise until the object is imaged sharply. If necessary, repeat this procedure three times and take the average of the readings. Adjust the second eyepiece in the same manner.

Mount the tube and eyepieces on the microscope body and tighten the securing screw firmly.

Adjust both eyepieces on the main microscope to +5 D.
Adjust both eyepieces on the assistant's microscope to +5 D (if applicable).

Turn the diopter scale on the eyepiece slowly clockwise until the reticle is imaged sharply.

Focus the surgical microscope on the object. The reticle and the object must be in focus at the same time.

Adjust the second eyepiece in the same manner until the object is seen sharply.

Adjust the eyecups in such a way that you can see the full field of view. Adjust maximum magnification on the surgical microscope and focus on the object. Adjust the working magnification required. When the magnification is changed, the focal plane is retained, but the depth of field changes.
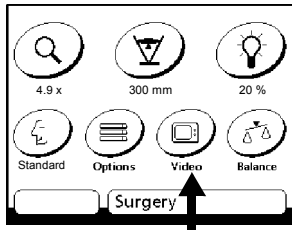
Note: If several surgeons use the instrument, it is advisable to draw up a table with the individual prescriptions and to keep it in a handy location near the instrument.
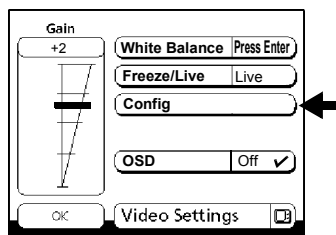
⚠ ***) Warning!** Never use the sun as the distant object!
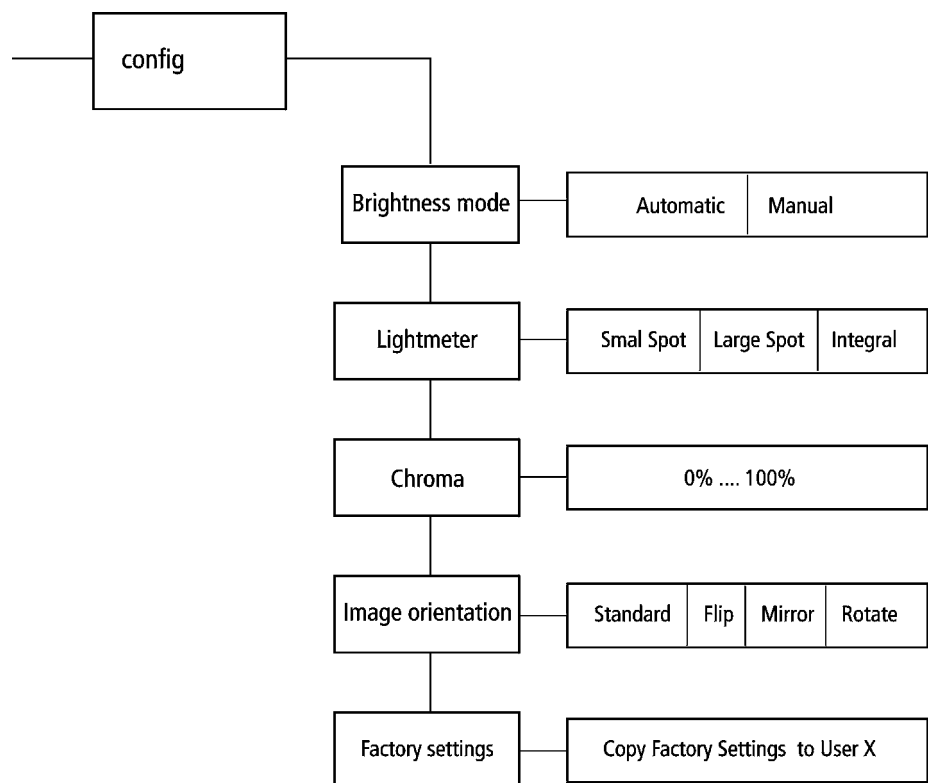
Configuring the camera settings (config)

The configuration menu permits you to configure the camera settings of the 1 chip video camera. The user program is set by default on delivery.

- To access the configuration menu, press the Video button in the Surgery menu.

- When you press the Video button, the Video Settings menu is displayed on the control panel.

- Press the "config" button to access the configuration menu.

- You can quit the configuration menu by selecting "OK".

The configuration menu is structured as follows:

config

Brightness mode	Automatic	Manual

Lightmeter	Smal Spot	Large Spot	Integral

Chroma	0% 100%

Image orientation	Standard	Flip	Mirror	Rotate

Factory settings	Copy Factory Settings to User X

Navigation in the Config mode using the control buttons

⋏⋎ Control buttons
Press the ⋏⋎ control buttons to access the submenu required. To activate the selected submenu, press the enter button.

Enter button
The enter button permits you to jump on from all submenus (except Chroma). The current setting is displayed on the right of the submenu bar. If you select "Factory Settings" (using the enter button) the display shows "processing" while the data is being loaded. On completion of the process, "ready" is displayed.

‹ › Control buttons
The Chroma submenu is the only one where you can set the percentage using the ‹ › control buttons.

Brightness

In the Brightness menu, you can manually adjust the brightness of the video image (GAIN) or have the brightness automatically controlled.

Automatic (Auto): standard setting for most applications
Allowance is automatically made for changing light conditions and the brightness level set on the GAIN control is adjusted accordingly. This ensures that the brightness of the displayed image is always constant. This function is particularly suitable for situations with varying illumination intensities.

Manual (Manu):
The image brightness is adjusted to the brightness set on the GAIN control. If a bright or strongly reflecting instrument is used in the surgical field, the instrument will produce glare. The remainder of the image is still clearly visible at the brightness level set on the GAIN control.

The mode currently selected is displayed on the right of the Brightness submenu bar.

• Press the OK button to save the selected mode and to return to the Surgery menu. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds and save the values set.

Lightmeter

Note:
The use of the Lightmeter function will only be meaningful if Brightness has been set to the automatic mode (Auto)

The Lightmeter selection window offers you the choice between three metering patterns provided by the video camera: integral, small or large.

– Integral (standard):
  The exposure is measured and averaged across the full video image. This metering pattern is recommended when the surgical field is fully and evenly illuminated.

– Large:
  The exposure is measured in a field in the image center. This metering pattern is ideal for working with an eclipsed surgical field edge (resulting from a reduced illuminated field diameter).

– Small:
  The exposure is measured in a very small field in the image center. This metering pattern is suitable for work in narrow channels when a very small illuminated field diameter is being used.
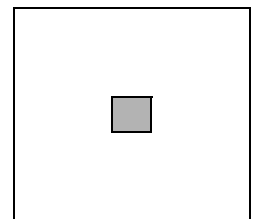
Press the enter button to change between the metering patterns.
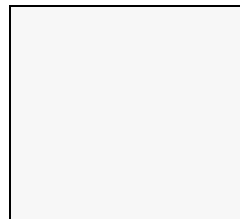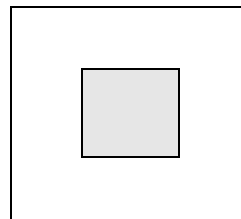
Integral	large	small

The metering mode currently selected is displayed on the right of the submenu bar.

• Press the OK button to save the selected mode and to return to the Surgery menu. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds and save the values set.

Chroma submenu

The Chroma submenu permits you to adjust the overall color impression provided by the camera.

Chroma
Use the ⟨ ⟩ control buttons for continuous adjustment of the color intensity in a range between 0% and 100%. The value currently set is displayed on the right of the Chroma submenu bar.

• Press the OK button to save the value set and to return to the Surgery menu. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds and save the values set.

Image Orientation

Use this menu to set the screen orientation.

The Image Orientation menu permits you to

- turn the image about the horizontal axis	Flip	F → Ŀ
- turn the image about the vertical axis	Mirror	F → ꟻ
- turn the image through 180°	Rotate	F → Ⅎ

Press the enter button to change between the options available.

The mode currently selected is displayed on the right of the submenu bar.

• Press the OK button to save the selected mode and to return to the Surgery menu. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds and save the values set.

Factory settings

After selection of this function, all settings of the selected user can be reset to the factory settings.

If you select "Factory Settings" (using the enter button) the display shows "processing" while the data is being loaded. On completion of the process, "ready" is displayed.

All settings of the selected user are now reset to the factory settings. The system returns to the Service menu after approx. 5 seconds or if you press any button.

• Press the OK button to save the selected mode and to return to the Surgery menu. If you do not press any button, the display will automatically jump back to the Surgery menu after approx. 30 seconds and save the values set.
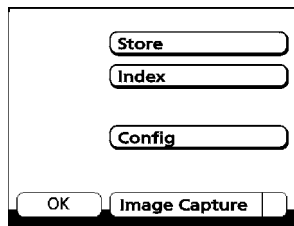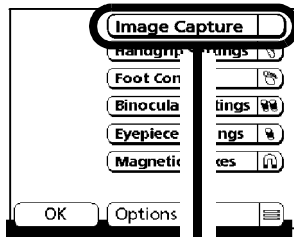
Configuring Image Capture

Image Capture permits you to save, view and delete image data in the JPEG or TIFF format.
The Config menu permits you to configure the Image Capture function.

•   Select the Options icon in the Surgery menu and press the Enter button.

•   Select Image Capture in the Options menu and press the Enter button.

•   Select Config and press the Enter button to access the configuration menu.

•   You can exit the configuration menu by selecting "OK".

The configuration menu is structured as follows:
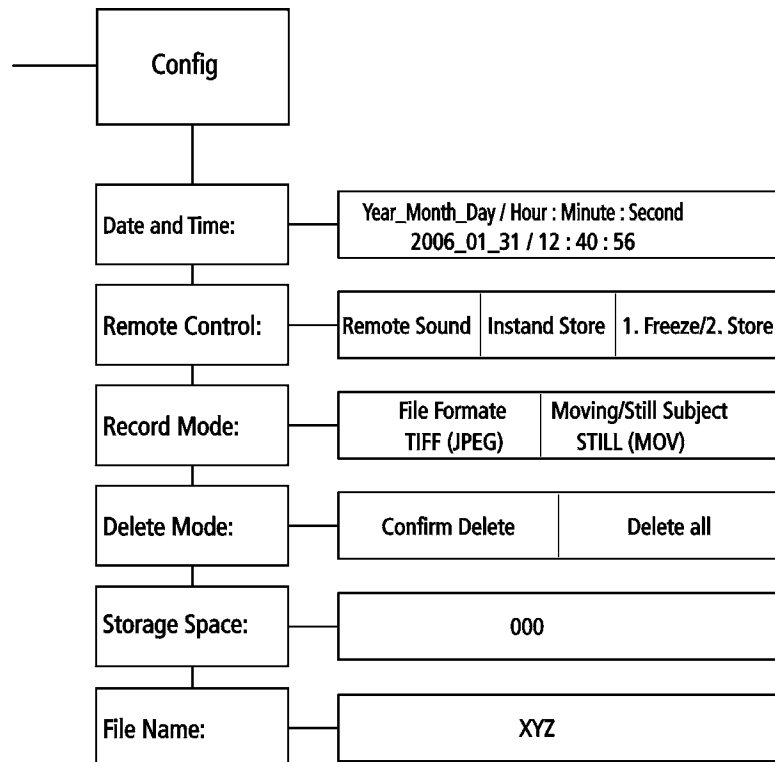
Date and Time submenu

The current date and time are displayed in the yyyy-mo-dd_hh-mi-ss format in large numerals on the video monitor. (yyyy = year, mo = month, dd = day, hh = hours, mi = minutes, ss = seconds). The time is constantly updated.

	Year	2005
	Month	12
2005_12_31	Day	31
10:25:45	Hour	10
	Minute	25
	Second	45
OK	Date and Time	

Use the "up" or "down" control key to select the category to be changed. Use the "right" or "left" control key to change the setting. The cursor keys have an autorepeat function for these settings, i.e. the respective numeric value changes while the key is pressed.

Press the <Enter> button to exit this menu item. The current date and time settings are saved immediately. The time and date set are shown in a display field on the left.
If no function is selected within 30 seconds, the system automatically changes to the superordinate menu.
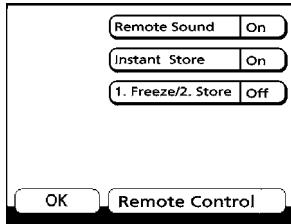
Remote Control

Here, you can switch the acoustic signal on and off and select the mode of operation of the remote switch connected to the Remote socket.

Handgrip buttons, buttons on a foot control panel or a separate foot switch can be used as remote control switches.

The "Remote Control" menu item includes the following submenus:

– Remote Sound

– Instant Storage or 1. Freeze / 2. Store

> Note:
> Instant Store and Freeze/Store are always effective alternatively. They cannot be activated or deactivated together.

Remote Sound
Two modes are available. Use the "left" or "right" control key to select:
Sound On / Sound Off

The default setting on delivery is "Sound On". A short beep is emitted whenever the contact in the Remote socket (contact short-circuited) is activated.

If "Sound Off" has been set, a short beep will only be emitted when the system is started (boot process).

Store options: Instant Storage or 1. Freeze / 2. Store
There are two options for the mode of operation of the remote switch on the Remote socket. Use the "down" or "up" control key to select:

"Instant Storage" setting:
When the remote switch is pressed, the current live video image is immediately saved on the connected USB stick.

"1. Freeze / 2. Store" setting:
– When you press the remote switch for the first time, the live video image is frozen and displayed as a full-frame image (same function as the <Freeze> button).

– When you press the remote switch again for longer than 1 second, the freeze frame is saved on the connected USB stick, and you return to the Live image mode (same function as the <Store> button), or:

– When you briefly press the remote switch again (< 1 second), you reject the freeze frame and return to the Live image mode (same function as the <Live> button).

Record mode
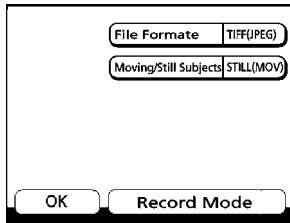
Here, you can select the format and the quality to be used by the MediLive ImageBox for the storage of the video images.

– JPEG / TIFF Files

– Still / Moving Subject

JPEG / TIFF Files
Do you want the MediLive ImageBox to store the video images only in the JPEG format or in both the JPEG and TIFF formats? Two modes are available. Use the "left" or "right" control key to select:

| JPEG Files | : | JPEG / TIFF Files |
| (max. 47) | | (max. 23 + 23) |

If you wish to store each image only in the JPEG format, a maximum of 47 images fits in the buffer.
If you wish to store each image in the JPEG and TIFF formats at the same time, a maximum of 23 images fits in the buffer.

The default setting on delivery is storage in the JPEG format only.

You can only switch between these two storage modes if there are no images in the buffer.

If the buffer contains any images and you try to switch between the storage modes, the following error message will be displayed:

Error: Change only possible without Images in Memory
Archive!

Still / Moving Subject
Do you want the MediLive ImageBox to store both fields of a video image or to store only one field? Two modes are available. Use the "down" or "up" control key to select:

– Still Subject (High Res)

– Moving Subject (Low Res)

Still Subject (High Res)
In this mode, the MediLive ImageBox stores both fields of the video signal for each video image. This mode provides the maximum resolution with still images.

The default setting on delivery is "Still Subject (High Res)".

Moving Subject (Low Res)
In this mode, the MediLive ImageBox only stores one field of the video signal for each video image. The MediLive ImageBox writes the individual lines twice below each other, thus replacing the missing field. This mode provides the maximum resolution with moving images (compensates for the blur caused by movement).

Even with freeze frames, the MediLive ImageBox only records one field of the video signal, computes the second field by doubling the lines and displays it on the video monitor. The same applies to the storage process.

Delete mode

Confirm Delete "On/Off"
Would you like to have to expressly confirm the "Delete" command for deleting image data from the USB stick, or would you like to delete without confirmation?

–   If you select Confirm Delete "On", you have to confirm every deletion action.

–   If you select Confirm Delete "Off", the selected image data is deleted without an inquiry.

Delete all
If you select "Delete all", the system will inquire whether you really want to delete the entire memory content. When you press the Enter button, all image data on the USB stick is deleted.
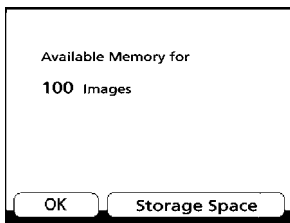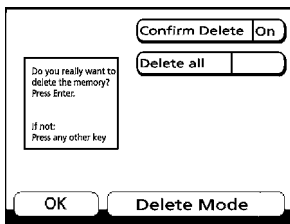
Storage space

The system displays how many images you can still save on the USB memory stick.

You cannot enter any data in this mode. Press Enter to exit the menu.

File Name

To extend the file name, you can enter a freely selectable name with up to 14 characters after the date and time. The file name extension is separated from the remaining name (date/time) by an underscore. In the index mode (graphic index) the extension is shown below the file name (date/time).

Entering the file name:
A virtual keypad is displayed on the video monitor for the entry of the file name, permitting you to enter all letters of the alphabet, numbers from 0 to 9, _, +, -, and space. The shift key for switching between upper and lower case letters, the delete and OK keys are also displayed on the screen. When you call up the menu, the cursor is set to the OK key.

File Name									
<									
1	2	3	4	5	6	7	8	9	0
q	w	e	r	t	z	u	i	o	p
a	s	d	f	g	h	j	k	l	+
⇓	y	x	c	v	b	n	m	-	_
OK			Space			Delete			

The text "File Name" indicates that an entry is expected. The entered name is displayed in the input field under "File Name". The entry is always limited by the "<" character. When the maximum number of 14 characters has been reached, the "<" character is no longer displayed.
Use the cursor keys to select the characters which are then highlighted in green color. When you press the Enter key, every selected character is entered in the "File Name" input field.
The cursor keys have an auto repeat function, i.e. when the character at the top of a column has been reached, the cursor jumps to the character at the bottom of the same column. The same applies to the character at the bottom and to the right and left ends of a line.

The "⇓" key is used to switch between upper case and lower case letters. Text is then written in upper case or lower case letters until you switch over again. On every system restart, the upper case mode is set automatically.

The delete key of the virtual keypad always deletes the last character of the file name entered.
The OK key brings you to the Configuration main menu. The file name you entered is buffered for the time being, and will be saved when you exit the configuration main menu, after an appropriate inquiry. Please note, however, that the extended file name is only available during the runtime of the application. When you shut down the system, the extended file name is automatically deleted. It will no longer be available when you switch the system back on.

Relocating the S7 floor stand

Note:
As the stand is very easy to maneuver, there is a tendency to underesti-mate its weight. Therefore, move the stand slowly and carefully!

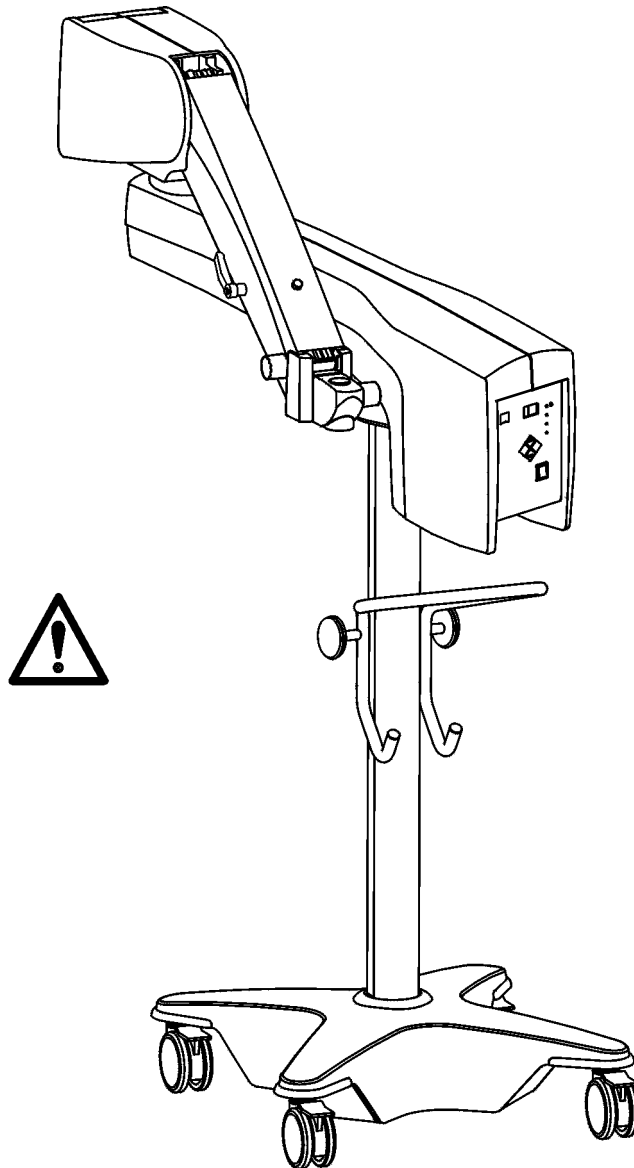Please observe the following points when relocating the stand:

- Turn off the system at the power switch.

- Unplug the power cord from the wall outlet.

- Fold the suspension arm to its moving position (see illustration on the opposite page).

- Wind up the cable of the foot control panel on one of the cable sup-ports, and hang the foot control panel on the handle.

- Wind up the power cord on the other cable support.

- Use the maneuvering handle for moving the stand.

- Be careful of heights when passing through doorways.

- Avoid collisions of any kind.

- Do not go over steps and edges: the stand might topple!

- Be extremely careful when moving over slopes.

- Do not park the stand on slopes.

- Press at least two of the brake tabs and make sure that the stand is no longer able to roll away by itself.

Note:
Over longer distances (e.g. removal, return for repair, etc), the instrument must always be transported in the original packaging or in special return packaging. Please contact your dealer or the Carl Zeiss service team.

Transportposition:
Moving position:
Position de transport :
Posición de transporte:
Posizione per il transporto:

Operation

Checklist for S7 floor stand

Always check the following points before surgery (without the patient!):

• Make sure that there is enough room between the instrument and the accessories installed and that protective cover (2) is removed from the objective lens.

• Turn on the system at the power switch of the suspension system.

Xenon illumination system
– The xenon lamp including the backup lamp is intact.

– The xenon illumination is on and the green indicator lamp is lit.

Note:
If the first lamp has failed and the backup lamp is in use (red segment in the switching knob lights up), make sure to have a backup lamp module ready at hand as a precaution.

Warning!
The xenon lamp has a limited service life of 500 h.

If used beyond its maximum service life, the xenon lamp may explode.

Change the xenon lamp in good time.

Please note the following guidelines - example:

– If operated for 4 hours/day on 5 days/week, the lamp needs to be exchanged after 25 weeks maximum.

– If operated for 8 hours/day on 5 days/week, the lamp needs to be exchanged after 12 weeks maximum.

Checking the illumination system
– Check that the lamp and the backup lamp are intact.

Checking the function of the handgrips
– Check that the handgrips are located in a position convenient for you, or one or both handgrips have been removed and replaced by the knobs supplied.

Check the zoom function
– Press the appropriate release button(s) on the handgrips.

Check the focusing function
– Press the appropriate release button(s) on the handgrips.

– When using a laser micromanipulator:
Check that the focal planes of the surgical microscope and microma-
nipulator coincide. Trigger a trial shot at a wooden spatula for this pur-
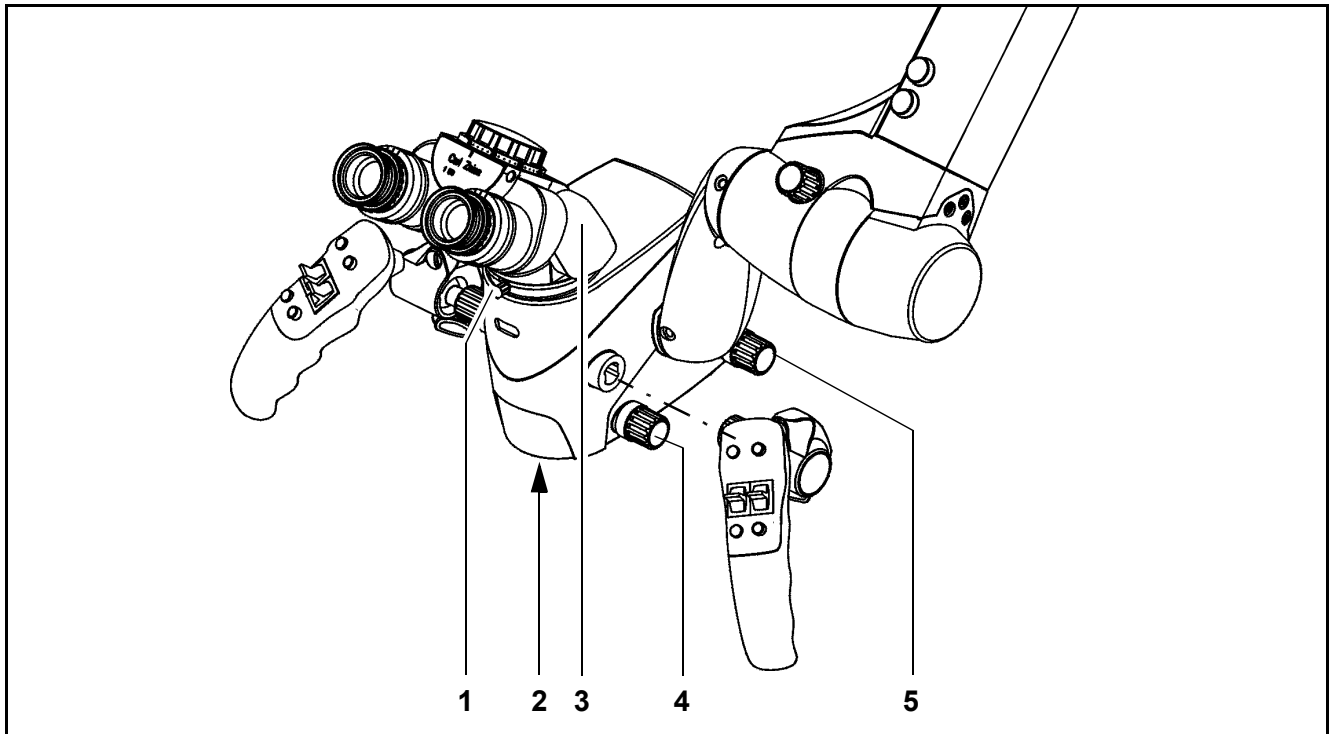pose. For a description, see page 136.

Checking the functions of the knobs
– Check the proper functioning of focusing knob (4) and filter selector
knob (5).

Eyepieces / binocular tube
– Check that binocular tube (3) has been securely mounted.

– Check that securing screw (1) has been firmly tightened.

– Check that the surgical microscope and the tube are in a position con-
venient for you.

– Check that the correct interpupillary distance has been set.

– Check that the eyecups have been adjusted in such a way that you
can see the full field of view.

– Check that the correct prescription has been set on the diopter scale.

– Check that image quality is the same throughout the entire magnifica-
tion range.

Balance
– Check that the surgical microscope has been correctly balanced.

⚠️

Warning!
If a function fails, you must not use this instrument for safety reasons. Correct the fault (see the "Troubleshooting table") or contact our service dept.

S7 floor stand

Checking the balance setting
– Check that the suspension arm has been properly balanced. When fully balanced, the surgical microscope should remain stationary in all positions within the work area and move neither upward nor downward.

Checking the limit of the suspension arm's downward movement
– Check that the minimum working distance (height) from the surgical field has been adjusted.

Stand base
– Check that at least two of the brake tabs have been pressed and prevent the stand from starting to move by itself.

Checking the accessories
– Proper functioning of all other equipment (surgical microscope, coobservation equipment, video system, etc.) has been checked using the relevant user's manuals.

Foot control panel (option)

– Check that the plug of the foot control panel has been connected.

– Check that the power switch of the suspension system has been switched on.

• Check that all functions assigned to the respective buttons on the foot control panel are working properly.

⚠️

Warning!
If a function fails, you must not use this instrument for safety reasons. Correct the fault (see the "Troubleshooting table") or contact our service dept.

SpeedFokus autofocus option

Settings and matching when using an external video camera
– Check that the video camera position, the focal length of the video optics and the size of the CCD array have been correctly entered in the Autofocus menu.

– Check that the video system and the surgical microscope have been matched to each other, i.e. when the image is in focus in the microscope eyepieces, the video image on the monitor must also be in focus (also applies to the integrated video camera).

– Check that the image on the monitor has the same orientation as the image in the main eyepieces.

Focusing process
Check that focusing can be activated according to the programming of the buttons:

– using button A, B, C and/or D of the handgrips.

– using button C and/or D of the foot control panel, if a foot control panel (option) is provided.

Checklist for S7 ceiling mount with rigid column

Always check the following points before surgery (without the patient!):

• Make sure that there is enough room between the instrument and the accessories installed and that protective cover (2) is removed from the objective lens.

• Turn on the system at the power switch of the suspension system.

Warning!
The xenon lamp has a limited service life of 500 h.

If used beyond its maximum service life, the xenon lamp may explode.

Change the xenon lamp in good time.

Please note the following guidelines - example:

– If operated for 4 hours/day on 5 days/week, the lamp needs to be exchanged after 25 weeks maximum.

– If operated for 8 hours/day on 5 days/week, the lamp needs to be exchanged after 12 weeks maximum.

Checking the illumination system
– Check that the lamp and the backup lamp are intact.

Checking the function of the handgrips
– Check that the handgrips are located in a position convenient for you, or one or both handgrips have been removed and replaced by the knobs supplied.

Check the zoom function
– Press the appropriate release button(s) on the handgrips.

Check the focusing function
– Press the appropriate release button(s) on the handgrips.

– When using a laser micromanipulator:
Check that the focal planes of the surgical microscope and micromanipulator coincide. Trigger a trial shot at a wooden spatula for this purpose. For a description, see page 136.

Checking the functions of the knobs
– Check the proper functioning of focusing knob (4) and filter selector knob (5).

Eyepieces / binocular tube
– Check that binocular tube (3) has been securely mounted.

– Check that securing screw (1) has been firmly tightened.

– Check that the surgical microscope and the tube are in a position convenient for you.

– Check that the correct interpupillary distance has been set.

– Check that the eyecups have been adjusted in such a way that you can see the full field of view.

– Check that the correct prescription has been set on the diopter scale.

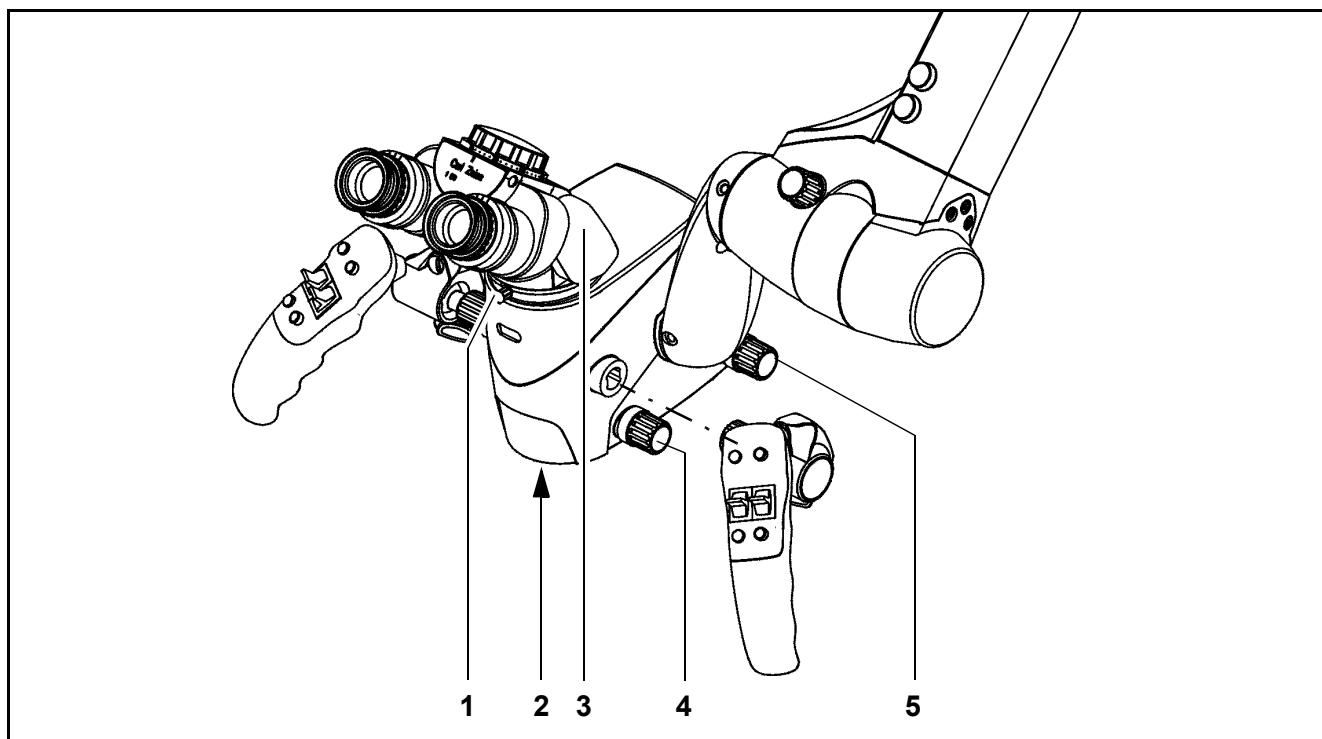– Check that image quality is the same throughout the entire magnification range.

Balance
– Check that the surgical microscope has been correctly balanced.

Balancing
– Check that the suspension arm has been properly balanced. When fully balanced, the surgical microscope should remain stationary in all positions within the work area and move neither upward nor downward.

Checking the limit of the suspension arm's downward movement
– Check that the minimum working distance (height) from the surgical field has been adjusted.

Foot control panel (option)

– Check that the plug of the foot control panel has been connected.

– Check that the power switch of the suspension system has been switched on.

• Check that all functions assigned to the respective buttons on the foot control panel are working properly.

Warning!
If a function fails, you must not use this instrument for safety reasons. Correct the fault (see the "Troubleshooting table") or contact our service dept.

SpeedFokus autofocus option

Settings and matching when using an external video camera
– Check that the video camera position, the focal length of the video optics and the size of the CCD array have been correctly entered in the Autofocus menu.

– Check that the video system and the surgical microscope have been matched to each other, i.e. when the image is in focus in the microscope eyepieces, the video image on the monitor must also be in focus (also applies to the integrated video camera).

– Check that the image on the monitor has the same orientation as the image in the main eyepieces.

Focusing process
Check that focusing can be activated according to the programming of the buttons:

– using button A, B, C and/or D of the handgrips.

– using button C and/or D of the foot control panel, if a foot control panel (option) is provided.

OPMI® Sensera on S7 Suspension Systems

Checklist for S7 ceiling mount with lifting column

Always check the following points before surgery (without patient!):

• Make sure that there is enough room between the instrument and the accessories installed and that protective cover (2) is removed from the objective lens.

• Turn on the system at the power switch of the suspension system.

Warning!
The xenon lamp has a limited service life of 500 h.

If used beyond its maximum service life, the xenon lamp may explode.

Change the xenon lamp in good time.

Please note the following guidelines - example:

– If operated for 4 hours/day on 5 days/week, the lamp needs to be exchanged after 25 weeks maximum.

– If operated for 8 hours/day on 5 days/week, the lamp needs to be exchanged after 12 weeks maximum.

Checking the illumination system
– Check that the lamp and the backup lamp are intact.

Checking the function of the handgrips
– Check that the handgrips are located in a position convenient for you, or one or both handgrips have been removed and replaced by the knobs supplied.

Check the zoom function
– Press the appropriate release button(s) on the handgrips.

Check the focusing function
– Press the appropriate release button(s) on the handgrips.

– When using a laser micromanipulator:
Check that the focal planes of the surgical microscope and micromanipulator coincide. Trigger a trial shot at a wooden spatula for this purpose. For a description, see page 136.

Checking the functions of the knobs
– Check the proper functioning of focusing knob (4) and filter selector knob (5).

Eyepieces / binocular tube
– Check that binocular tube (3) has been securely mounted.

– Check that securing screw (1) has been firmly tightened.

– Check that the surgical microscope and the tube are in a position convenient for you.

– Check that the correct interpupillary distance has been set.

– Check that the eyecups have been adjusted in such a way that you can see the full field of view.

– Check that the correct prescription has been set on the diopter scale.

– Check that image quality is the same throughout the entire magnification range.

Balance
– Check that the surgical microscope has been correctly balanced.

⚠ **Warning!**
If a function fails, you must not use this instrument for safety reasons. Correct the fault (see the "Troubleshooting table") or contact our service dept.

Checking the lifting column
– Check the function of the lifting column by operating the selector switch.
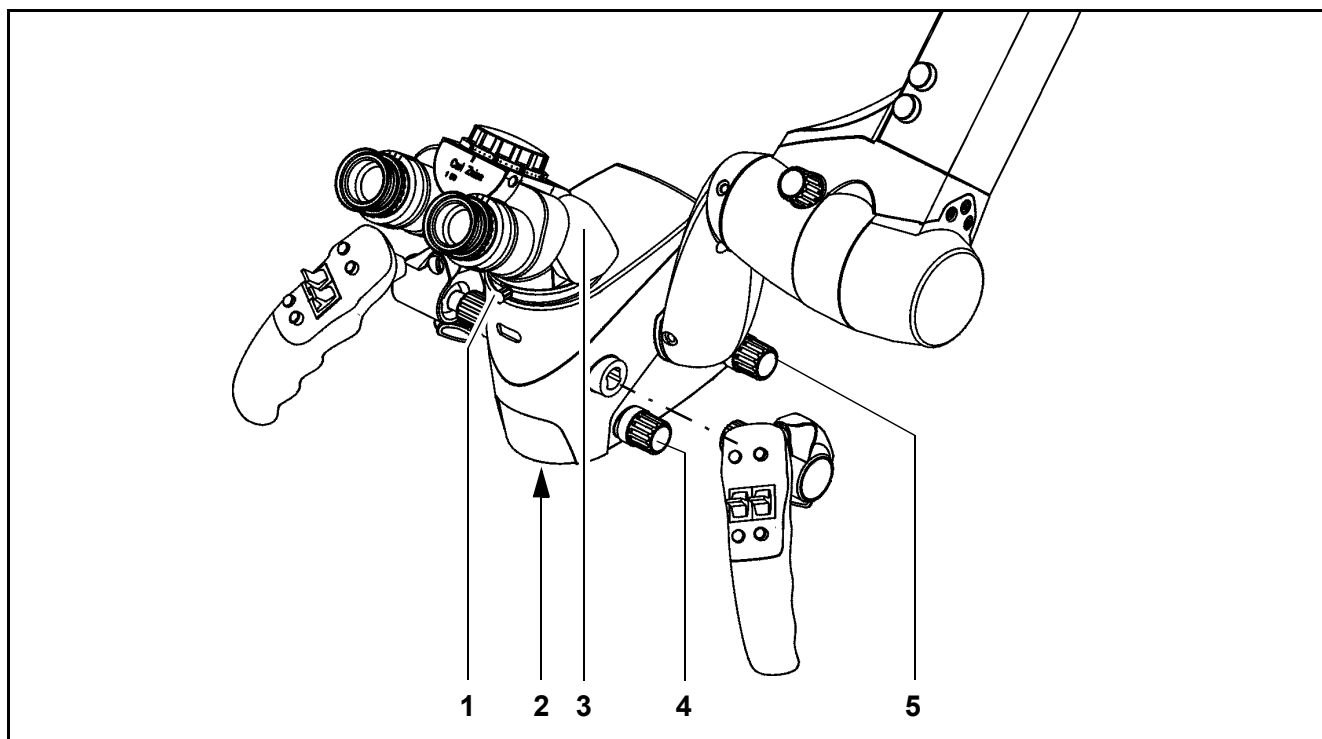
1   2 3   4   5

Checking the balance setting
– Check that the suspension arm has been properly balanced. When fully balanced, the surgical microscope should remain stationary in all positions within the work area and move neither upward nor downward.

Checking the limit of the suspension arm's downward movement
– Check that the minimum working distance (height) from the surgical field has been adjusted.

Checking the accessories
– Using the manuals provided, check that the other equipment (surgical microscope, coobservation tube, video system, etc.) is functioning properly.

Foot control panel (option)

– Check that the plug of the foot control panel has been connected.

– Check that the power switch of the suspension system has been switched on.

• Check that all functions assigned to the respective buttons on the foot control panel are working properly.

Warning!
If a function fails, you must not use this instrument for safety reasons. Correct the fault (see the "Troubleshooting table") or contact our service dept.

SpeedFokus autofocus option

Settings and matching when using an external video camera
– Check that the video camera position, the focal length of the video optics and the size of the CCD array have been correctly entered in the Autofocus menu.

– Check that the video system and the surgical microscope have been matched to each other, i.e. when the image is in focus in the microscope eyepieces, the video image on the monitor must also be in focus (also applies to the integrated video camera).

– Check that the image on the monitor has the same orientation as the image in the main eyepieces.

Focusing process
Check that focusing can be activated according to the programming of the buttons:

– using button A, B, C and/or D of the handgrips.

–   using button C and/or D of the foot control panel, if a foot control panel (option) is provided.

Procedure

- Turn on the instrument at the power switch of the suspension system.

- Set the required brightness of the surgical field illumination on the suspension system.

- Check the instrument using the checklist.

- Swing the surgical microscope over the surgical field into an ergonomic position within the working distance.

- Select the lowest magnification (zoom).

- For coarse focusing, look through the eyepieces and lower the surgical microscope until the surgical field comes into focus.

- Select the highest magnification (zoom).

- Look through the eyepieces and activate the focusing function until the microscope is sharply focused on the surgical field.

- Select the magnification required (zoom). Look through the eyepieces of the binocular tube. Adjust the eyepieces in such a way that you can see both the edge of the field of view and the microscope image sharply.

- Bring the handgrips into a position convenient for the procedure planned and tighten locking screws (1).

- Switch off the instrument when you are not using it.

1
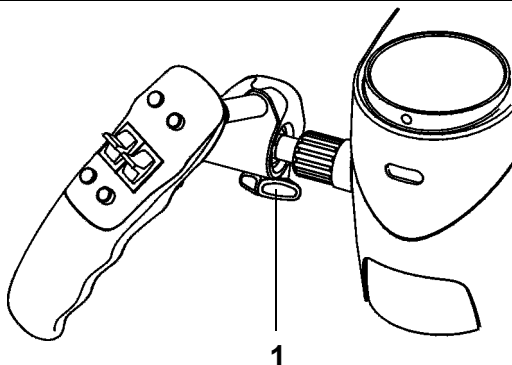
Working with the SpeedFokus autofocus option

The SpeedFokus autofocus option permits you to select an area of special interest to you in the surgical field. SpeedFokus focuses on this selected area at the press of a button. Focusing is triggered on the buttons of the handgrip or foot control panel as configured in the Options menu.

- Look through the eyepieces and activate the focusing function until the image of the surgical field appears sharply focused. The image on the video monitor must also be focused.

- Watch the image on the video monitor and position the square frame for the measuring field (ROI) in the area in which you are particularly interested.

- Activate focusing by the SpeedFokus autofocus function.

Note:
If the ROI in the surgical field is marked by major height differences with steeply sloping edges, it may happen that SpeedFokus focuses on the wrong feature in the surgical field. You can correct this as follows:

- Slightly shift the ROI and/or reduce its size.

- Re-activate focusing by the SpeedFokus autofocus function.

Display and deletion of images (USB option)

Index menu
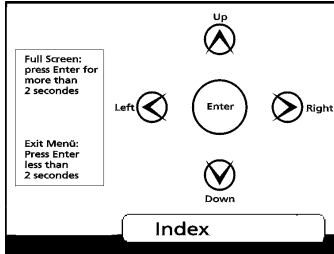
After selection of the Index menu, the display shown on the left appears. At the same time, the thumbnails are displayed on the monitor.

Use the arrow keys to navigate in the thumbnails. When you press OK, the program goes to the next higher level. If you press the Enter button for longer than 2 seconds, the slected thumbnail is displayed as a full-screen view.

Saved images are displayed as a graphic index with 12 distortion-free, de-magnified images (thumbnails) per screen page. The image name and, if available, the extended file name (see Config menu: File Name) are shown below the image. The thumbnails are arranged in the order of their generation. The thumbnail index starts with the oldest thumbnail at the top left. The most recent thumbnail is shown at the bottom right.If there are less than 12 thumbnails on a page, the other image positions will not be used.
The thumbnail stored last is marked with a blue frame. Using the control keys (cursor keys) you can select the thumbnail required. A blue frame marks the selected thumbnail.
Press the enter key to display the selected thumbnail as a full-screen image on the video monitor. When you have reached the first or last image, an error symbol and the text "Last Image" will be displayed. Press the Enter button to return to the graphic index.
Press the Enter button to exit the graphic index and to switch to the live image mode.

If no images are available, the error message "No Images - Check USB Stick" is displayed.

The program does not automatically return to the next higher menu. You can exit the menu by pressing the Enter button for less than 2 seconds.

Full Screen / Delete Image

If you press the Enter button for more than 2 seconds, the display shown on the left appears:
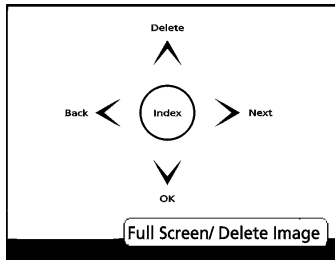
Delete	image is deleted
Next	next image is displayed on the monitor
Back	previous image is displayed on the monitor
OK	return to the previous Index menu
Index	return to the Index menu

In the Full Screen menu, the Video Capture function permits you to activate the next or previous image via the handgrip. If you press the button for less than 0.5 seconds, the next image is displayed; if you press the button for longer than 0.5 seconds, the previous image is displayed in the full-screen mode. The system does not return automatically to the superordinate menu.
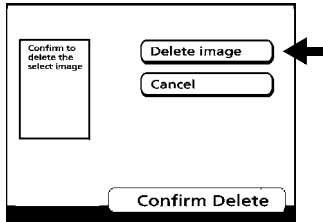
If "Confirm Delete: On" was set in Config menu/Delete mode, the Confirm Delete window is opened when you press the Delete button.

Select "Delete image" to delete the selected image. The image is deleted when you press the Enter button.

If no function is selected within 30 seconds, the system automatically changes to the superordinate menu.

What to do in an emergency

Failure of the focusing function

<u>Motor running constantly</u>

- Bring the suspension arm into its horizontal position and tighten locking knob (4) firmly.

- Loosen and remove knurled nut (1).

- Lift cover (2) and pull out cable connection (3) for the surgical microscope (large connectors) to the side. Carefully lower the cover and allow it to rest lightly on the cable.

- Unplug cable connection (3) for the surgical microscope (large connectors).

- Manually focus by turning focusing knob (5)

    or

- focus by moving the suspension arm up or down.

<u>Motor not working</u>

- Manually focus by turning focusing knob (5)

    or

- focus by moving the suspension arm up or down.

1
2
3
4

5
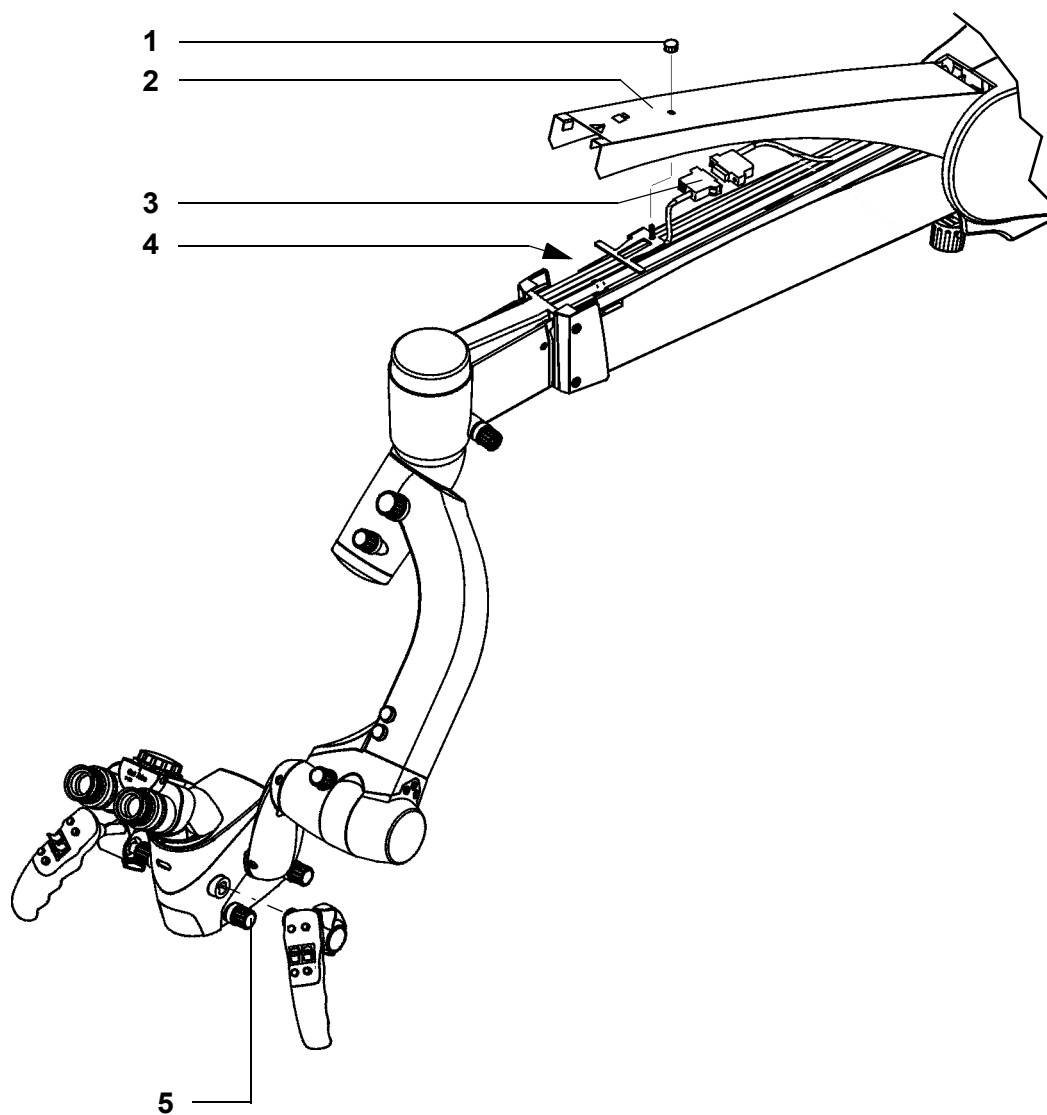
Failure of the zoom function

<u>Motor running constantly</u>
- Bring the suspension arm into its horizontal position and tighten locking knob (4) firmly.

- Loosen and remove knurled nut (1).

- Lift cover (2) and pull out cable connection (3) for the surgical microscope (large connectors) to the side. Carefully lower the cover and allow it to rest lightly on the cable.

- Unplug cable connection (3) for the surgical microscope (large connectors).

- Use a suitable, pointed object to remove plastic cover (5).

- Adjust the magnification manually using zoom wheel (6).

<u>Motor not working</u>
- Use a suitable, pointed object to remove plastic cover (5).

- Adjust the magnification manually using zoom wheel (6).

1
2
3
4
5
6
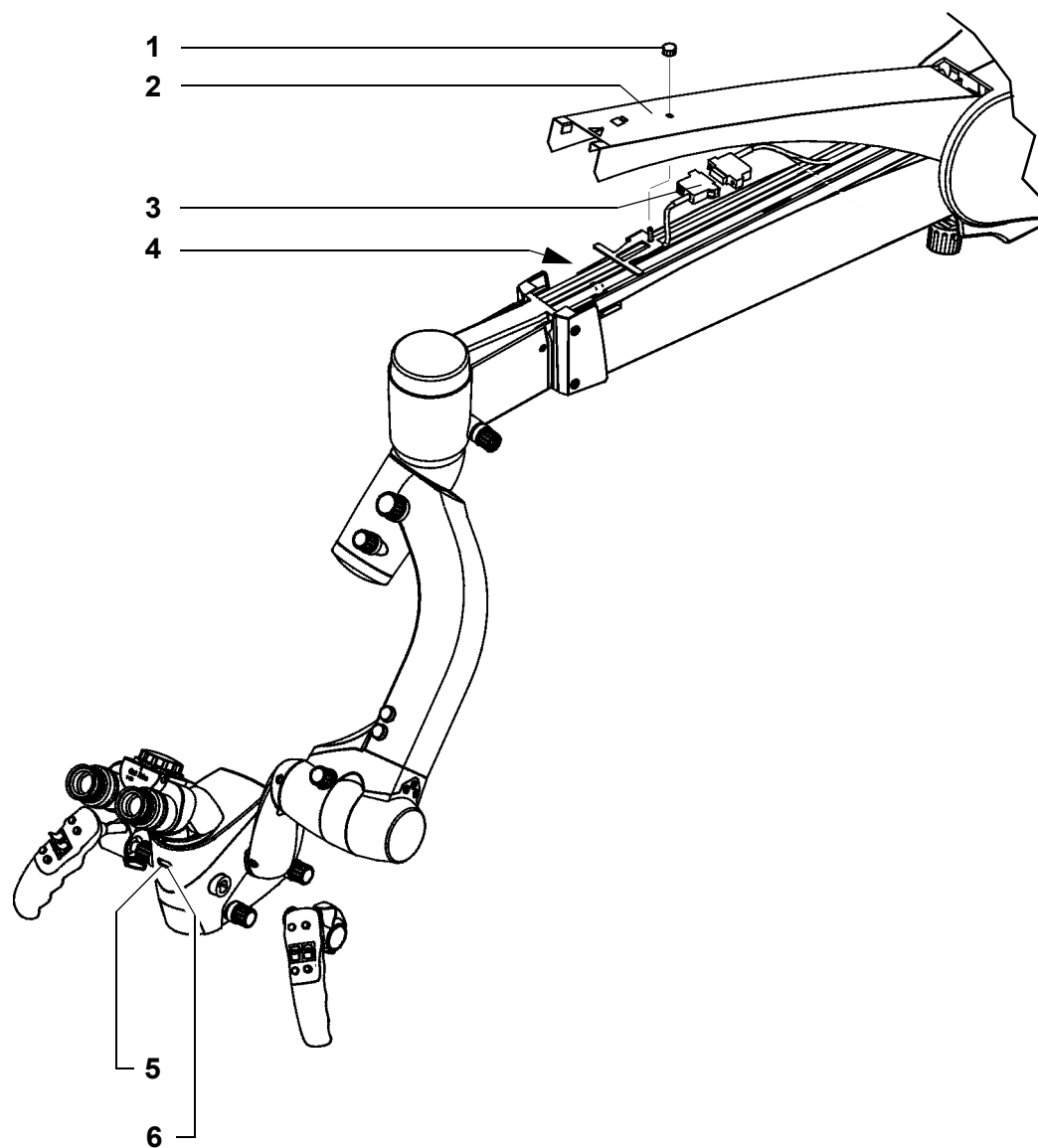
Failure of the halogen lamp

Caution:
Do not cover ventilation grid (2)! For example, drapes could be covering the grid. This can lead to overheating of the lamp modules and to lamp failure.

Note:
The lamp housing contains a backup lamp which is automatically swung into the illumination beam path when the first lamp fails. Open flap (3) indicates that the backup lamp is operative.

Manual selection of the backup lamp

Press button (4) to manually activate the backup lamp.

If the backup lamp fails:

Warning!
If you replace the lamp shortly after it has failed, the lamp will still be very hot. Wear heat-protection gloves to avoid burns!

- Turn off the suspension system at the power switch.

- Press button (5) to slightly eject lamp module (1). Remove the lamp module and replace the bulb or insert a backup lamp module.

- Switch the suspension system back on. Adjust the brightness of the illumination system as required.
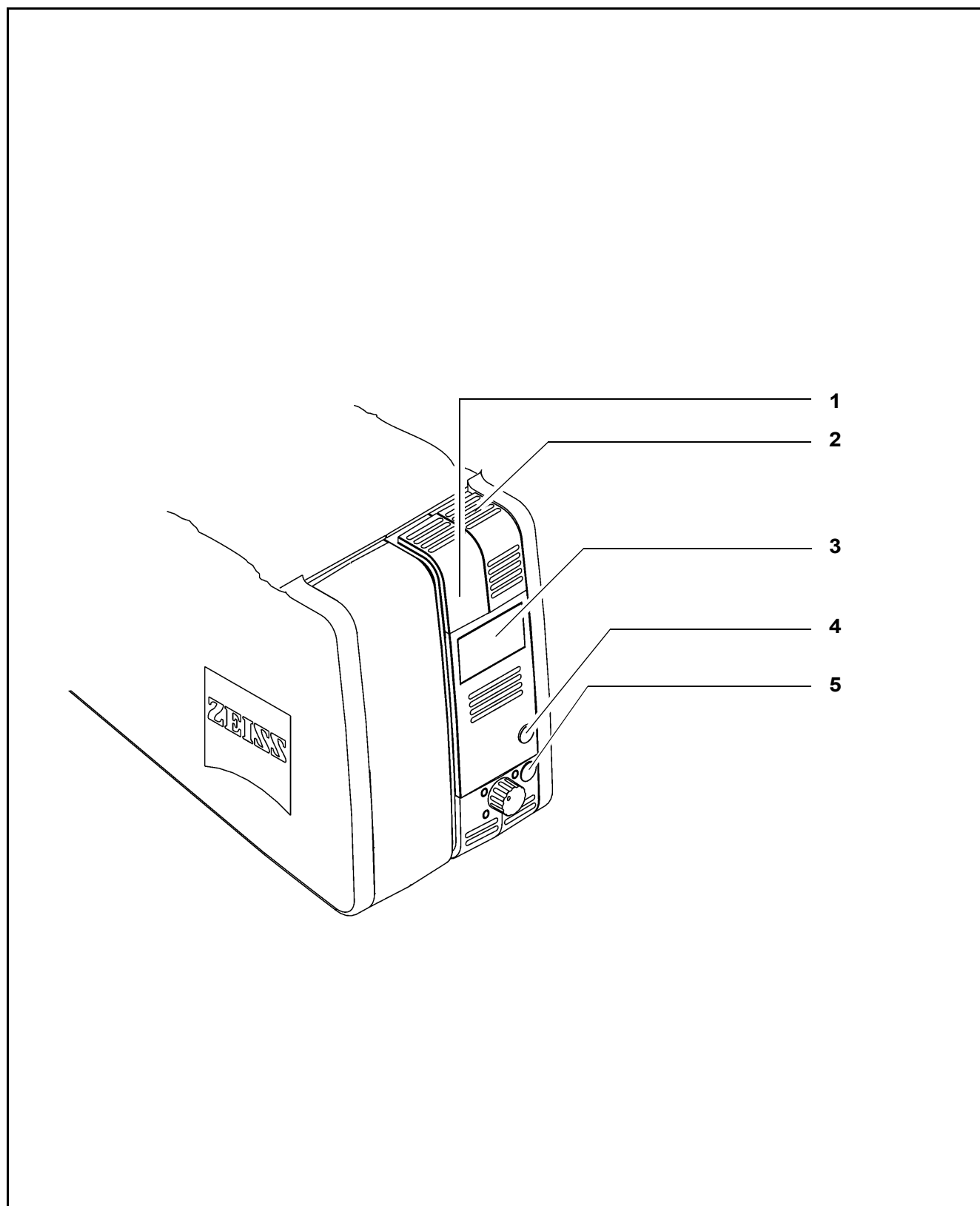
Lamp failure of the xenon illumination

Warning!
Lamp rupture (audible as a loud bang) may lead to jamming of the lamp module and/or failure of the electronics modules.

- Before opening the lamp housing, make sure that the system is moved to a position where neither the patient nor the user is put at risk by falling items.

- Do not continue using the system if the lamp module is jammed or the illumination is no longer operational due to defective electronics modules. Inform our service department.

Caution:
Do not cover the ventilation grid! For example, drapes could be covering the grid. This can lead to overheating of the lamp module and to lamp failure.

Switching to the backup lamp

- Turn off the suspension system at the power switch before switching to the backup lamp.

The lamp module contains two xenon lamps. The second lamp is used as a backup lamp which can be swung into the illumination beam path when the first lamp fails.
If the first xenon lamp fails, you can open lamp module (2) as follows:
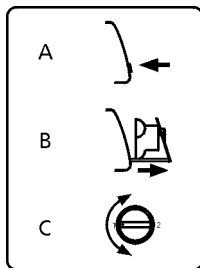
- Press button (4). The lamp module is slightly ejected.

- Pull out the lamp module as far as it will go.

- Turn knob (1) through 180° until it snaps in. This swings the second xenon lamp (backup lamp) into the beam path.

- Push the lamp module all the way back into the lamp housing.

1

2

3

4
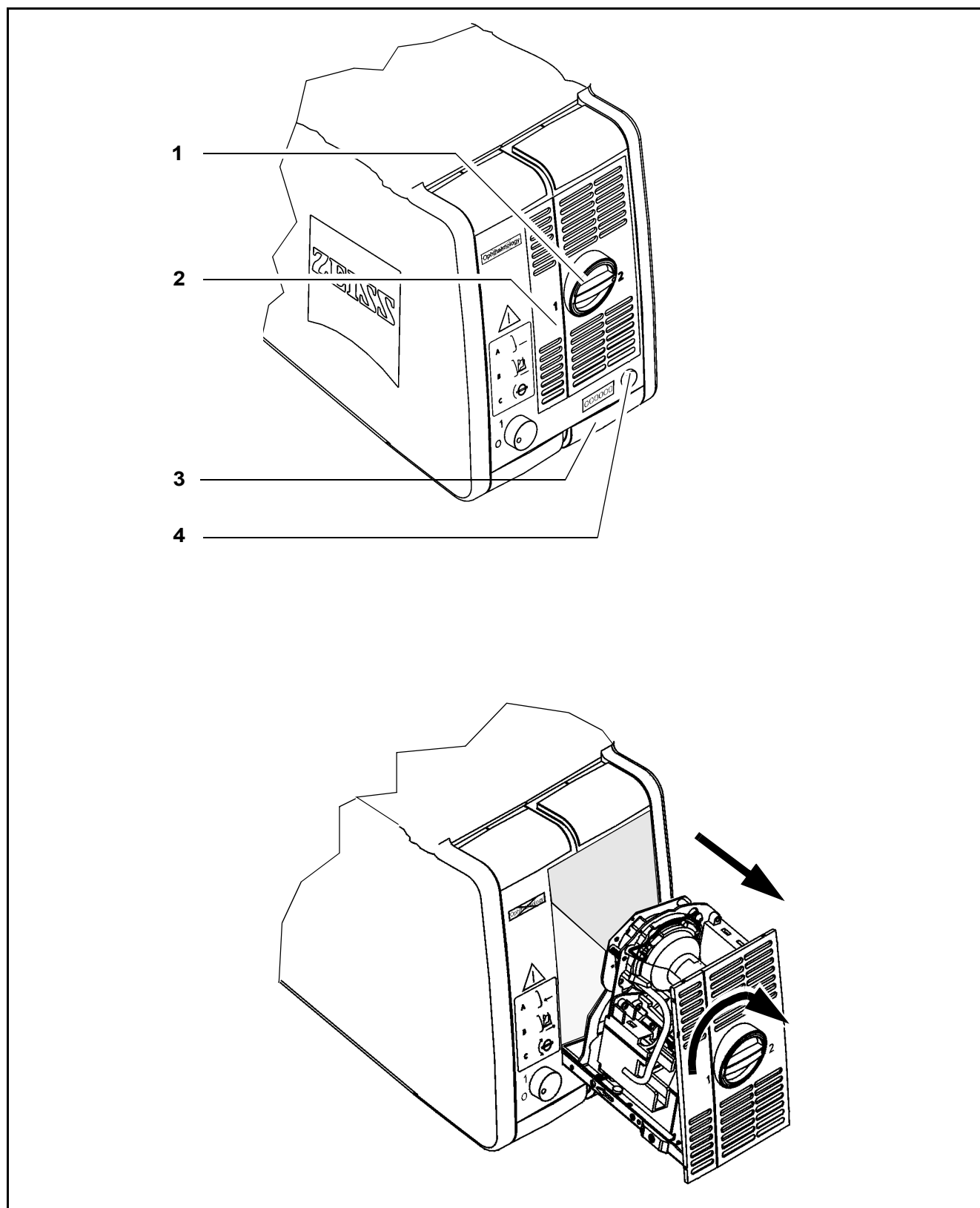
- Reset the service hour counter to "0". Use a pointed object and press it into the recess of reset button (3).

- Turn the suspension system back on at the power switch.

Note:
If the first lamp has failed and the backup lamp is in use (red segment in knob (1) lights up), make sure to have a backup lamp module ready at hand as a precaution.
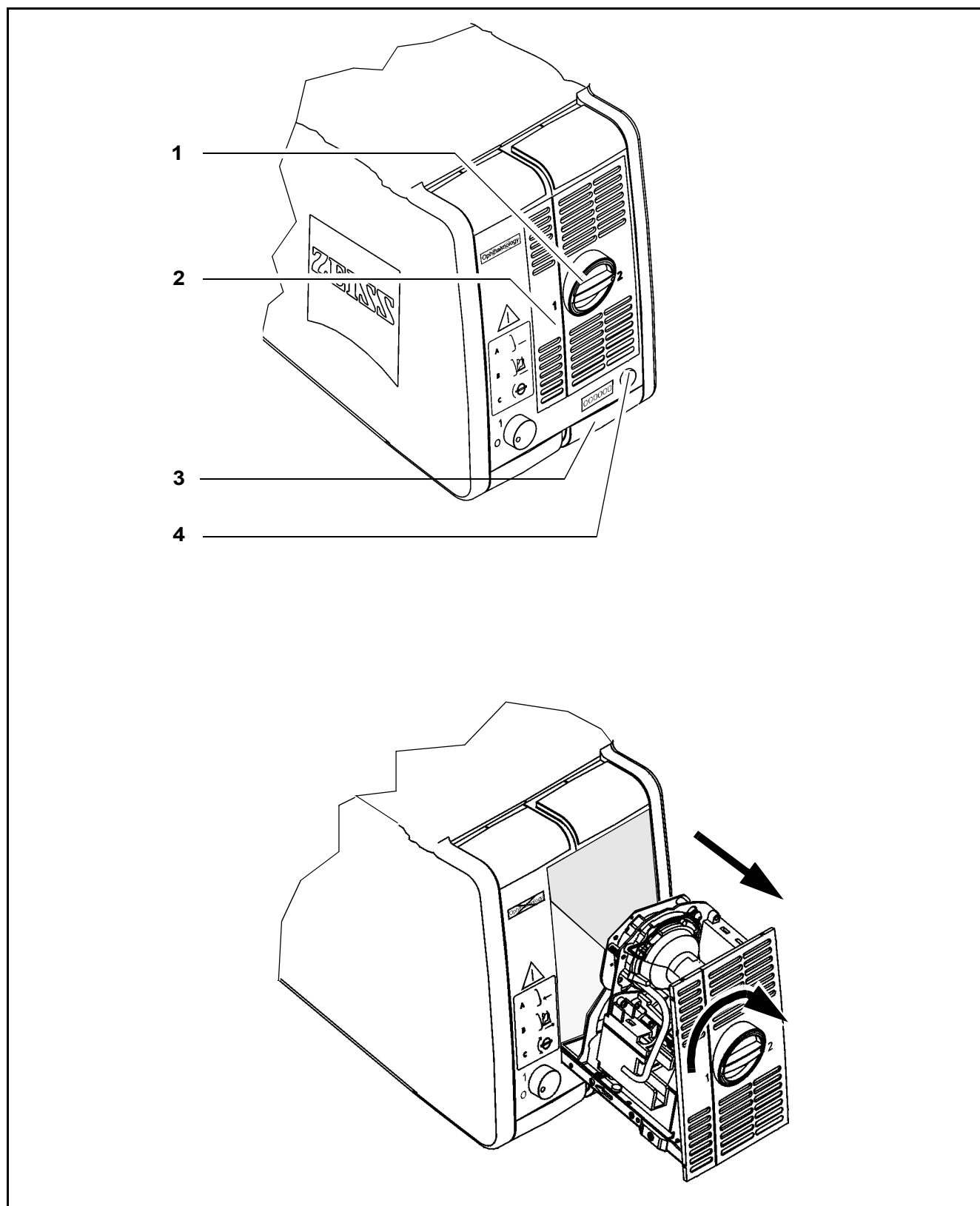
Failure of the SpeedFokus autofocus option

Failure of the SpeedFokus autofocus option with otherwise correct function of the OPMI Sensera / S7 system:
You can continue using your OPMI Sensera / S7 system, but you can no longer benefit from the SpeedFokus autofocus option until it has been repaired by the service staff.

- Continue surgery using the motorized focusing system of the OPMI Sensera.

- Focus the image manually on the OPMI Sensera.

Maintenance / Further information

Trouble-shooting

- This instrument is a high-grade technological product. To ensure optimum performance and safe working order of the instrument, its safety must be checked once every 12 months. We recommend having this check performed by our service representative as part of regular maintenance work.
  If a failure occurs which you cannot correct using the trouble-shooting table, attach a sign to the instrument stating it is out of order and contact our service representative.

OPMI Sensera

Problem	Possible Cause	Remedy	See
Handgrip buttons without function.	Line power failure.	Contact in-house electrician.	-
	Suspension system not switched on.	Switch on the system at its power switch.	page 82
	Automatic circuit breaker in power switch of suspension system has been activated.	Press power switch again. If the system does not work, operate the surgical microscope manually.	-
Zoom or focus without function.	Defective motor.	Adjust zoom or focus manually. Contact service dept.	page 42
	Zoom or focus system always moves to upper or lower end position.	Open the cover on the suspension arm and disconnect the cable to the surgical microscope (large connector). Contact service dept.	page 172 page 174
Surgical microscope tilts forward / backward or sideward.	Surgical microscope not balanced or incorrectly balanced.	Balance surgical microscope.	-
Motion of surgical microscope too stiff.	Friction adjustment knobs tightened too firmly.	Loosen friction adjustment knobs and adjust friction correctly.	page 54

S7 suspension system

Problem	Possible Cause	Remedy	See
No function at all.	Line power failure.	Contact in-house electrician.	-
	Suspension system not switched on.	Switch on the system at its power switch.	page 82
	Automatic circuit breaker in power switch of suspension system has been activated.	Press power switch again. If there is no function, contact service dept.	-
Surgical field illumination on microscope not working.	Defective main and backup lamps.	Change lamp or insert backup lamp module.	page 190
	Thermal cut-out in lamp housing has been activated.	Remove the cause of overheating. For example, drapes could be covering the ventilation grid of the lamp housing. When the lamp module has cooled down, the illumination switches on again.	-
	Failure of suspension system electronics.	Illuminate surgical field using an OR illuminator. Contact service dept.	-
Insufficient surgical field illumination.	Brightness level set too low.	Adjust brightness on the suspension system's display panel or using the foot control panel.	page 88
	Halogen lamp not properly plugged into lamp mount.	Properly push halogen lamp into lamp mount.	page 190
	Defective light guide (illumination not uniform).	Contact service dept. Light guide probably needs to be changed.	-
Motorized focusing and /or zoom function of surgical microscope is inoperative.	Failure of suspension system electronics.	Manually adjust focusing and / or zoom on surgical microscope.	-
Motion of suspension arm too stiff.	Friction adjustment knob tightened too firmly.	Slightly loosen friction adjustment knob.	page 54
Floor stand wobbles.	Floor not level. Stand base not appropriately positioned.	Slightly change the stand base position.	-

Problem	Possible Cause	Remedy	See
No video image	Incorrect connection of cables.	Check all connections	-
No video image, only color bars.	Camera head not connected.	Connect the camera head.	page 122
Image with color tinge.	No white balance.	Perform white balance procedure.	page 97
Image without color.	Y/C cable between CCU and monitor not properly plugged in.	Properly plug in the cable.	-
	Defective Y/C cable between CCU and monitor.	Use different Y/C cable or BNC cable.	
Video image too bright or too dark.	Too little or too much light.	Adjust GAIN (video signal amplification) or set Brightness to Auto (automatic mode).	page 97
No image / video indicator lamp is lit.	Monitor not switched on or not correctly set .	Switch on monitor or set it to correct channel. Set monitor to default status, or increase brightness and contrast.	Note user's manual for monitor.
	Connecting cable between CCU and monitor or between CCU and surgical microscope not or not properly plugged in.	Properly plug in the cable.	-
	Defective connecting cable between CCU and monitor.	Change the cable.	-
	If a video recorder is connected between CCU and monitor: defective video recorder.	Directly connect the CCU and monitor.	-
	Defective CCU or camera head in surgical microscope, or defective connecting cable between CCU and surgical microscope.	Contact service dept.	-

Problem	Possible Cause	Remedy	See
Image too dark / snow effect on monitor	Monitor not correctly set.	Set monitor to default status, or increase brightness and contrast.	Note user manual for monitor.
	Brightness of CCU set too low.	Increase brightness of CCU.	-
	Surgical field illumination too dark.	Increase brightness of illumination.	page 88
Image too bright / milky image on monitor.	Monitor not correctly set.	Set monitor to default status, or reduce brightness and/or contrast	Note user manual for monitor.
	Brightness of CCU set too high.	Reduce brightness of CCU.	-
	Surgical field illumination too bright.	Reduce brightness of surgical field illumination.	page 88
ENT application: image detail too bright in black speculum (glare).	Brightness of CCU set too high.	Center the speculum and object in the image.	-
	Brightness control is based on black color of speculum.	Use a metal speculum (gray, stainless steel).	-

SpeedFokus video autofocus

Problem	Possible cause	Remedy	See
SpeedFokus video autofocus is inoperative.	Camera control unit (CCU) switched off.	• Switch on MediLive CCU.	-
	Monitor switched off.	• Switch on the monitor.	-
	Failure of the SpeedFokus video autofocus system.	• Contact service dept.	-

Problem	Possible cause	Remedy	See
Poor focusing result or none at all.	Focusing of the video camera not matched to focusing of the surgical microscope.	• Focus the microscope image, then the video image.	-
	Measuring field (ROI) incorrectly positioned.	• Correct the ROI position in submenu "AF - ROI Position".	page 95
	Suspension system moved during focusing.	• Do <u>not</u> move suspension system during focusing.	-
	No object in focusing range.	• Reposition surgical microscope.	-
	No object with sufficient contrast in focusing range.	• Reposition surgical microscope or focus manually.	-
When using an external video camera: Poor focusing result or none at all.	Incorrect entry for camera orientation (left/right).	• Call up Autofocus menu and change Camera Position.	page 94
	Incorrect entry for Video Focal Length.	• Call up Advanced Settings submenu and enter correct focal length.	page 95
	Video camera not correctly oriented.	• Turn video camera so that the video image corresponds to main observer's viewing direction.	-
Focused video image on monitor, but unfocused image in surgical microscope.	Setting of diopter rings on eyepieces has been changed.	• Set diopter rings to zero or to the correct value.	page 48
Focused image in surgical microscope, but unfocused video image on monitor.	Focusing of video camera has not been matched to focusing of surgical microscope.	• Focus the microscope image, then the video image.	-

Problem	Possible cause	Remedy	See
Focusing cannot be activated.	Different function assigned to handgrip button (A, B, C or D).	• Call up the Handgrip Settings menu and assign the Autofocus function to one of the buttons.	page 91
	Different function assigned to foot control panel button (C or D).	• Call up the Foot Control menu and assign the Autofocus function to one of the buttons.	page 91

Replacing the halogen lamp

Warning!
If you replace the lamp shortly after it has failed, the lamp will still be very hot. Wear heat-protection gloves to avoid burns!

Note:
If both halogen lamps (3 and 4) fail during surgery, insert an available spare lamp module. For this reason, always make sure before surgery that the halogen bulbs in the spare lamp module are intact.

To replace the lamp, proceed as follows:

• Turn off the unit at the power switch.

• Press button (2), the lamp module is slightly ejected. Remove lamp module (1).

• Remove the defective halogen lamp from the spring-loaded mount.

• Pull ceramic base (7) from the contact pins of the halogen lamp.
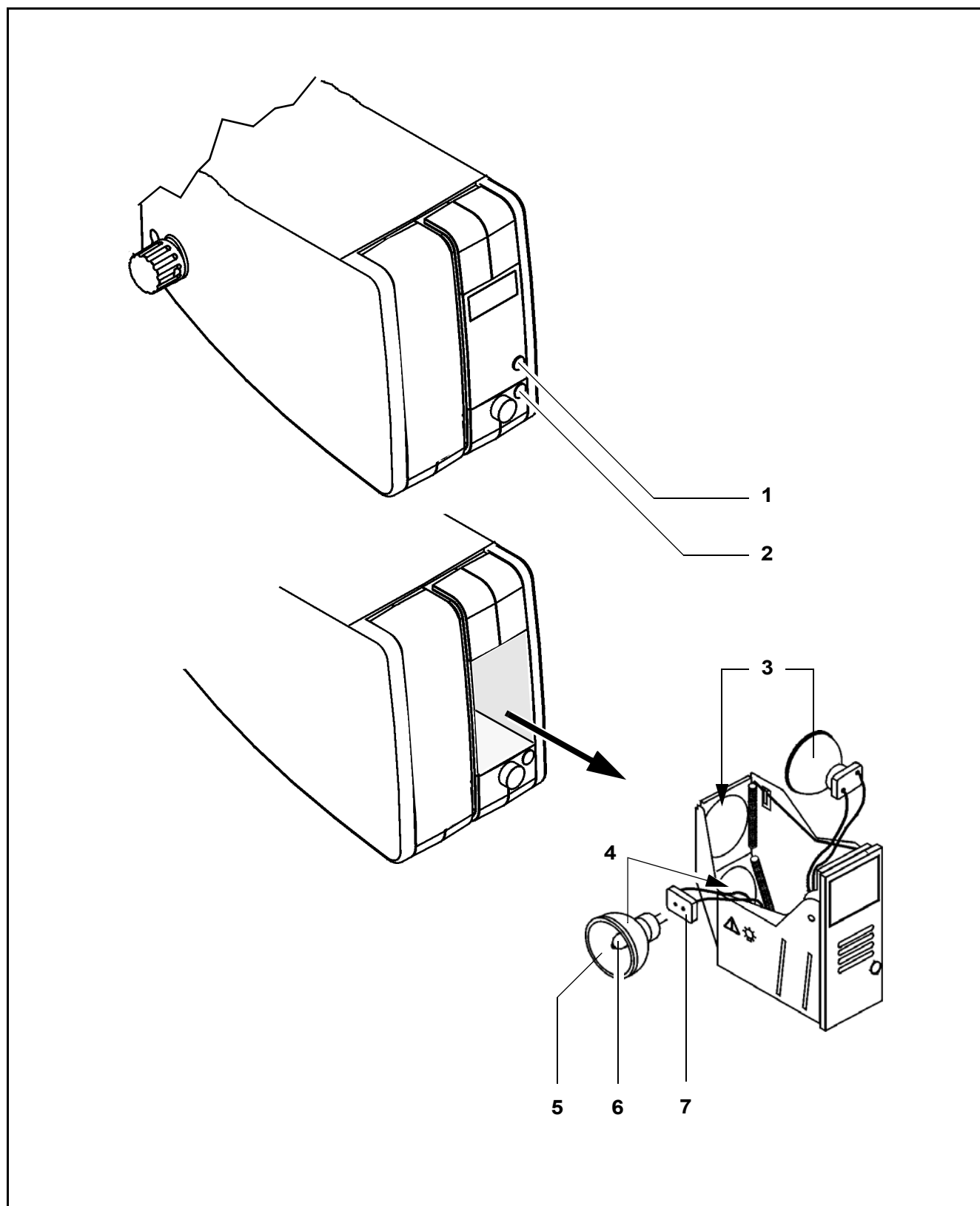
- Plug ceramic base (7) onto the contact pins of the new halogen lamp.

- Insert the new halogen lamp. Make sure you do not touch lamp bulb (6) or the interior of reflector (5).

- Press the halogen lamp into the spring-loaded mount.

- Push the lamp module including the new halogen lamp back into the unit.

- Turn on the system at its power switch.

Note:
– Only use 12 V, 100 W halogen lamps available under the specified Cat. No. Cat. No.: 38 00 79- 9040

To use the service life of your halogen lamps as economically as possible, we recommend that you proceed as follows: If main lamp (3) has failed, remove it and replace it by backup lamp (4). Install the new halogen lamp instead of the backup lamp.
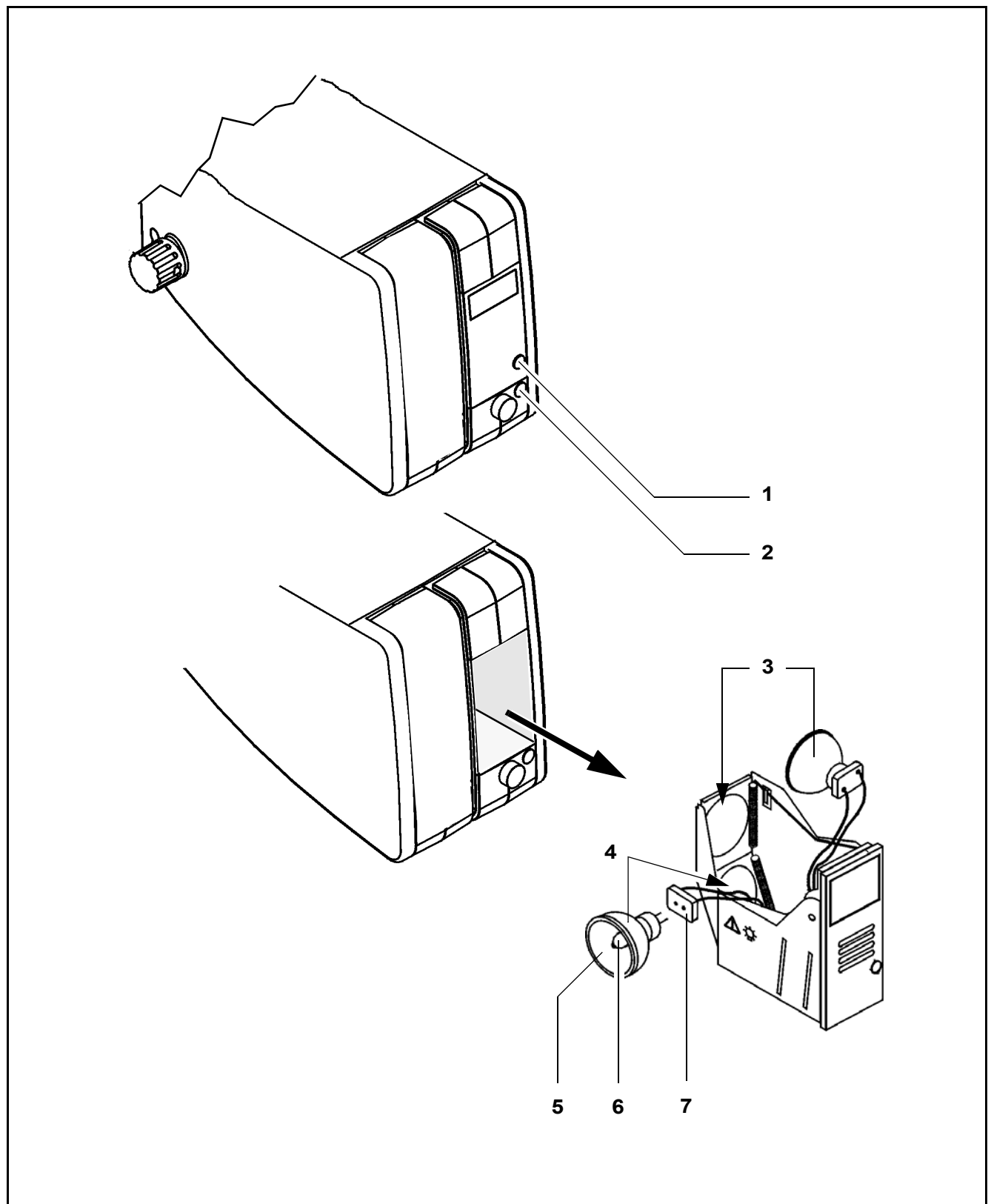
Changing the xenon lamp module

Warning!
The lamp module must only be changed by appropriately trained personnel. Improper handling of the xenon lamp may lead to damage or injury.

Warning!
Lamp rupture (audible as a loud bang) may lead to jamming of the lamp module and/or failure of the electronics modules.

- Before opening the lamp housing, make sure that the system is moved to a position where neither the patient nor the user is put at risk by falling items.

- Do not continue using the system if the lamp module is jammed or the illumination is no longer operational due to defective electronics modules. Inform our service department.

Change the lamp module as follows:

- First switch off the suspension system at the power switch.

- Only change the lamp module after it has cooled down completely! In the event of a malfunction, there is a risk of explosion due to the high pressure inside the hot lamp. The hot surface of the xenon lamp may also cause burns.

- Only change the module after switching off the system. The igniter produces high voltage when the system is on.

- Press button (1). The lamp module is slightly ejected.

- Pull out the lamp module as far as it will go.

- Slide the original transport case (2) over the module, making sure that bolt (3) engages in bore (4). This unlocks the stop.

- Remove the old module and install the new lamp module by proceeding in the reverse order.

- Check the function of the xenon lamp and backup xenon lamp.

1

2

3

4

5
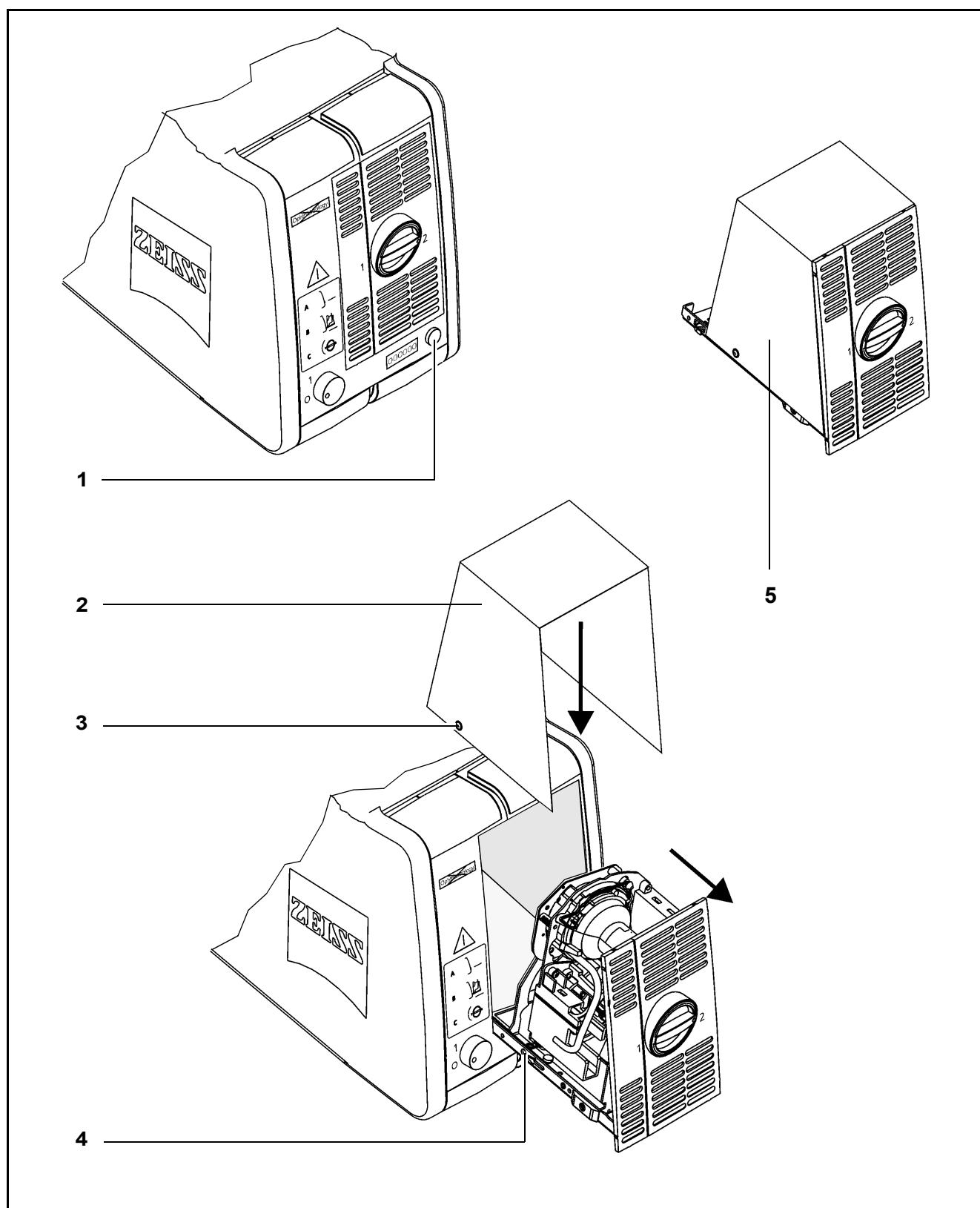
Pack the old lamp module (5) in the transport package of the new lamp module. Fill in the enclosed return card and send the old lamp module to the nearest Carl Zeiss service agency.

Note:
- Only use the original transport case (2) as it also provides explosion protection, should xenon lamps be defective.
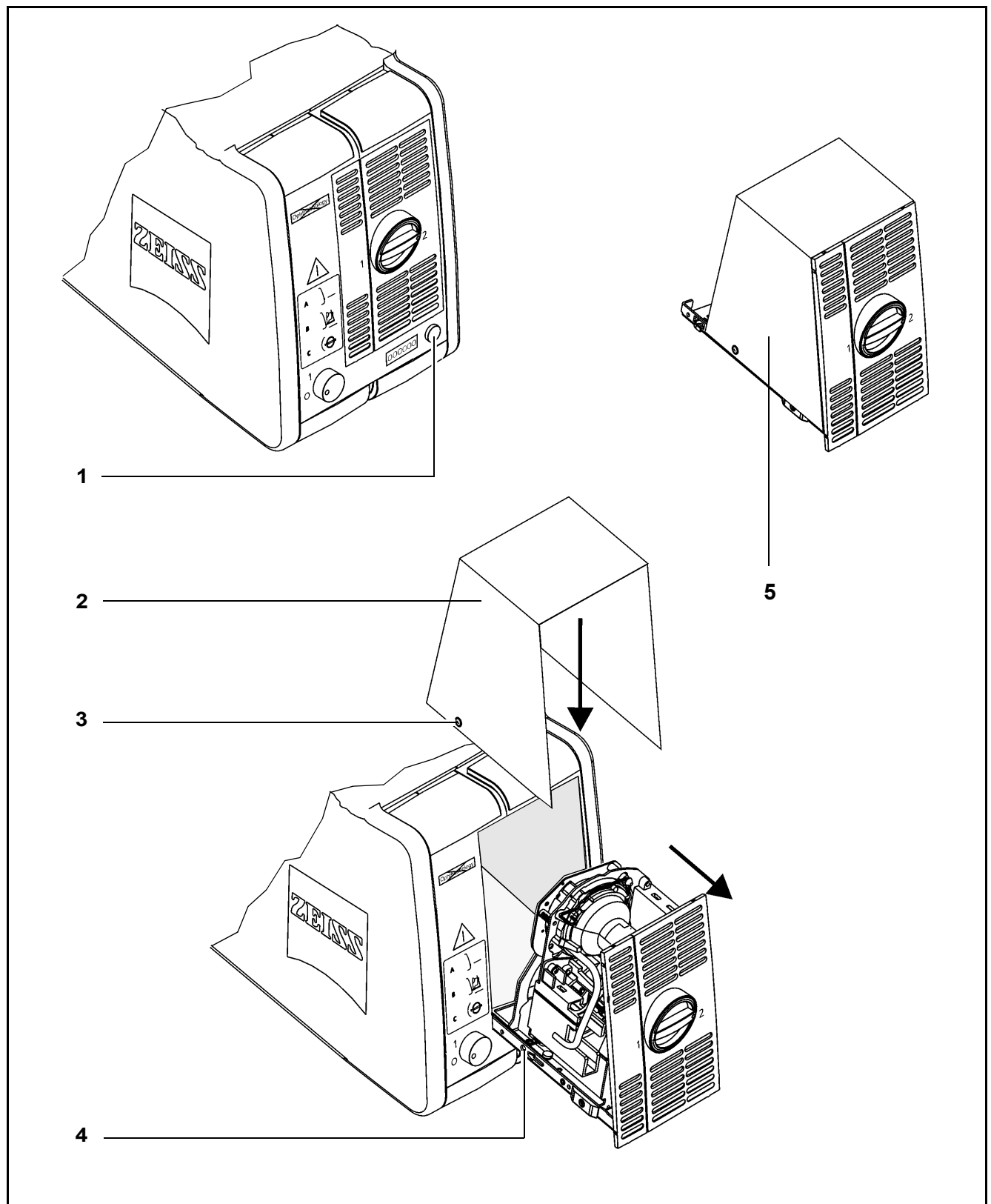
Magnifications / Fields of view

If the magnification factor γ of the zoom system is known, you can calculate the total magnification of the surgical microscope. The following equation is used to determine the total magnification:

$$M_T = \frac{f_{tube}}{f_{obj}} \cdot \gamma \cdot M_{eye}$$

where:

f_{tube} the focal length of the binocular tube

f_{obj} the focal length of the main objective lens (does not correspond to working distance!)

γ the magnification factor of the zoom system

M_{eye} the magnification of the eyepiece

Example:

f_{tube}= 170 mm, f_{obj} = 300 mm, γ = 1.6 and M_{eye} = 12.5 x.

The resulting total magnification is:

$$M_T = \frac{170 \text{ mm}}{300 \text{ mm}} \cdot 1.6 \cdot 12.5 = 11.3$$

If the total magnification of the surgical microscope M_T is known, you can use the formula:

$$FoV_D = \frac{FoVN \cdot M_{eye}}{M_T}$$

to calculate the field of view diameter FoV_D of the surgical microscope. The field of view diameter is the diameter of the circular surgical field which can be seen through the eyepieces.
FoVN in the above formula stands for the field of view number of the eyepiece.

By entering the value MT = 11.3 in the formula, we obtain the following field of view diameter for 12.5x eyepieces with a field of view number FoVN of 18 mm:

$$FoV_D = \frac{18 \text{ mm} \cdot 12.5}{11.3} = 19.9 \text{ mm}$$

Notes:
– Field of view numbers:
  10x widefield eyepiece: FoVN 21
  12.5x widefield eyepiece: FoVN 18

– With the Varioskop objective lens integrated in the OPMI Sensera, there is a considerable difference between the working distance displayed and the focal length. See table page 212.

Care of the unit

⚠ **Warning!**
If possible, the systems and accessories should be cleaned immediately after use. Contaminations should not be allowed to dry on the objects, as this would make cleaning and disinfecting more difficult.

If possible, machines should be used for disinfecting and cleaning. For details, please also see the relevant notes on sterilization equipment.

Cleaning optical surfaces

The multi-layer T* coating of the optical components (e.g. eyepieces, objective lenses) ensures optimum image quality.
Image quality is impaired by even slight contamination. To protect the internal optics from dust, the system should never be left without the objective lens, binocular tube and eyepieces. After use, cover the system to protect it from dust. Always store optical components and accessories in dust-free cases when they are not being used.

Clean the external surfaces of optical components as required:

Caution:
Do not use any chemical detergents or aggressive substances. These may damage the optical surfaces.

- Remove coarse dirt (splashes of blood etc.) using distilled water to which a dash of household dish-washing liquid has been added. Wipe the surfaces only with a damp, under no circumstances with a wet cloth.
  Any remaining marks can be easily removed using the following aids.

- For thorough cleaning of optical surfaces, use the optics cleaning set (Cat. No. 1216-071) or damp optics cleaning wipes (available from specialized dealers).

- Remove minor contaminations such as dust, streaks, etc. using a clean microfiber cleaning cloth (available from specialized dealers or under Cat.No. 1254-655).

Fogging of optical surfaces

To protect the eyepiece optics from fogging, we recommend using an anti-fogging agent.

Note:

Anti-fogging agents provided by eyecare professionals for use with eyeglass lenses are also suitable for Zeiss eyepieces.

• Please observe the instructions for use supplied with each anti-fogging agent.

Anti-fogging agents do not only ensure fog-free optics. They also clean the eyepiece optics and protect them against dirt, grease, dust, fluff and fingerprints.

Auxiliaries from Zeiss

Optics cleaning kit, Cat. No. 1216-071

Suitable for the regular cleaning of objective lenses and eyepieces of surgical microscopes.

Cleaning mechanical surfaces

All mechanical surfaces of the equipment can be cleaned by wiping them with a damp cloth. Do not use any aggressive or abrasive detergents.

Wipe off any residue with a mixture of 50% ethyl alcohol and 50% distilled water plus a dash of household dish-washing liquid.

Sterilization

The asepsis sets available from Carl Zeiss contain rubber caps, sleeves and handgrips which can be sterilized in autoclaves. We recommend the following program for sterilization:

Sterilization temperature: 134° C

Sterilization time: 10 minutes

Sterile single-use drapes are available to cover the system.

Note:
When draping the system, make sure there is enough slack in the drapes to allow for movement of the microscope carrier and surgical microscope. It is especially important that the drapes are completely loose around the handgrips. The surgeon must be able to operate the keys through the drape.

Disinfecting the control keys

To be able to use the system in the OR, for example, it may be necessary to disinfect the control keys. We recommend using MELISEPTOL disinfectant solution (B. Braun, Melsungen AG). Carl Zeiss keeps MELISEPTOL in stock, and you can also obtain it locally in many countries from representatives of B. Braun, Melsungen AG.

Warning!

– Wear disposable plastic gloves to prevent skin contact with the disinfectant.

– MELISEPTOL is inflammable (flame point at 31 °C). Please read the product information from B. Braun, Melsungen AG.

To apply MELISEPTOL, proceed as follows:

• Switch off the unit before disinfecting.

• Apply the disinfectant across the entire surface of the control panel. Do not let any disinfectant seep into the unit.

• Leave the disinfectant on the unit for approx. 30 minutes.

• Then carefully wipe the disinfectant off the surface using a sterile, lint-free cloth.

• Dispose of the gloves and cloth as normal waste.

You can obtain the following articles from Carl Zeiss:

	Cat. No.
1 l MELISEPTOL in vario bottle	000000-0103-907
MELISEPTOL HBV spray, 250 ml	000000-0103-910
MELISEPTOL HBV cloths	000000-0103-911

Disposable gloves:

Size 1 (large) size 8-9	000000-0117-736
Size 2 (medium) size 7-8	000000-0117-737

Ordering data

Sensera surgical microscope

Description	Cat. No.
Sensera surgical microscope	000000-1183-793
External motorized fine focusing module for OPMI Sensera (option)	000000-1208-783
180° tiltable tube	303791-0000-000
Straight tube (option)	303765-0000-000
12.5x eyepiece (2x)	305543-9901-000
10x eyepiece (2x) (option)	305542-0000-000
Dust cover	000000-1055-278

S7 floor stand for OPMI Sensera

Description	Cat. No.
S7 floor stand, consisting of:	-
S7 floor stand, basic equipment, manual	000000-1087-851
S7 electrical components kit for OPMI Sensera	000000-1166-100
Set of panels for S7 floor stand	000000-1120-147
Xenon illumination system, complete	000000-1120-932
Halogen illumination system, complete (option)	000000-1119-657
Foot control panel 2, with 14 functions, 3 m cable (optional)	304979-9030-000
Foot control panel 2, with 8 functions, 3 m cable (optional)	304978-9010-000
Socket for foot control panel	000000-1191-636
Europe	000000-0301-997
USA	000000-0147-000
UK	000000-0400-264
Switzerland	309850-9011-000
Argentina	000000-0434-527
China	000000-0475-507

S7 ceiling mount for OPMI Sensera

Description	Cat. No.
S7 ceiling mount, consisting of:	-
S7 ceiling mount / Office	000000-1103-022
S7 electrical components kit for OPMI Sensera	000000-1166-100
Halogen illumination system, complete	000000-1119-657
Xenon illumination system, complete (option)	000000-1120-932
Foot control panel 2 with 14 functions, 6 m cable (optional)	304979-9050-000
Foot control panel 2 with 8 functions, 6 m cable (optional)	304978-9050-000
Socket for foot control panel	000000-1191-636
S7 wall socket	000000-1351-565

S7 ceiling mount with lifting column for OPMI Sensera

Description	Cat. No.
S7 ceiling mount, consisting of:	-
S7 ceiling mount with lifting column	000000-1226-405
S7 electrical components kit for OPMI Sensera	000000-1166-100
Halogen illumination system, complete	000000-1119-657
Xenon illumination system, complete (option)	000000-1120-932
Foot control panel 2, with 14 functions, 6 m cable (optional)	304979-9050-000
Foot control panel 2, with 8 functions, 6 m cable (optional)	304978-9050-000
Socket for foot control panel	000000-1191-636
S7 wall socket	000000-1351-565

SpeedFokus autofocus option in S7 suspension systems with OPMI Sensera

Description	Cat. No.
SpeedFokus autofocus in S7 with 1CCD PAL	308203-9020-000
SpeedFokus autofocus in S7 with 1CCD NTSC	308203-9060-000
SpeedFokus autofocus in S7 for external CCU	308203-9240-000

Retrofit kits for OPMI Sensera on S7 suspension systems

Description (UC = upgrade component)	Cat. No.
UC video retrofit Sensera PAL	000000-1335-937
UC video retrofit Sensera NTSC	000000-1335-955
UC external focusing module	000000-1240-880
UC halogen-to-xenon conversion kit	000000-1295-527
UC foot control panel connection	000000-1237-540

Spare parts

Description	Cat. No.
Dust cover	000000-1055-278
12 mm asepsis caps (item 1: 6 pcs)	305810-9002-000
22 mm asepsis caps (item 2: 6 pcs)	305810-9001-000
Asepsis caps for 180° tiltable tube (6 pcs)	305810-9003-000
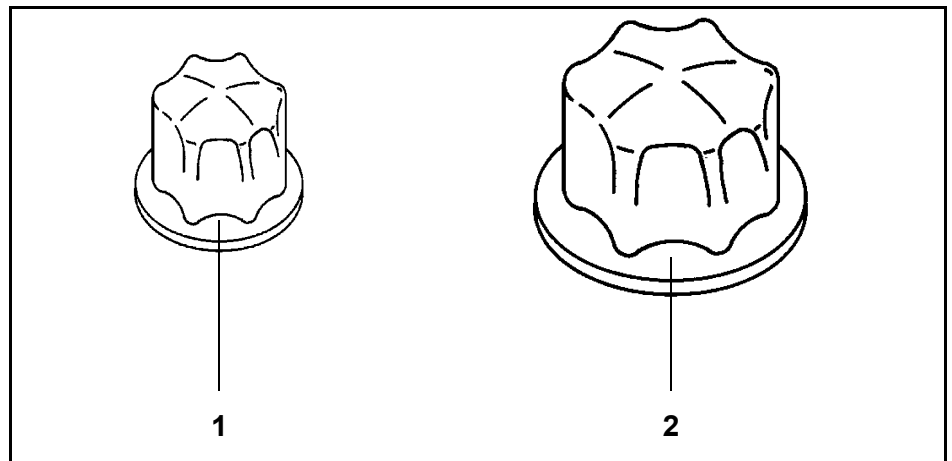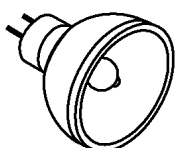
Video

Description	Cat. No.
Y/C connection cable, 2 m long (2x)	301687-9102-000
Y/C extension cable, 12.5 m long	301687-9110-000
BNC (VBS) connection cable, 10 m long (2x)	301687-9101-000
Y/C connection cable (plug - plug), 5 m long	000000-300-281
Y/C extension cable, 5 m long	HAMA Cat. No.: 42734
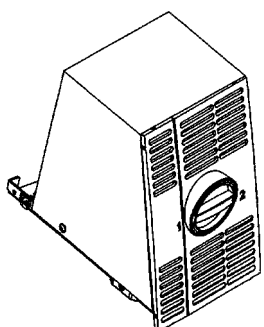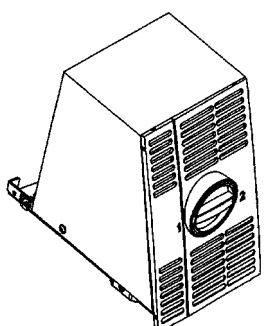
Handgrips

Description	Cat. No.
Labeling set	000000-1296-703

Halogen illumination system

Description	Cat. No.
12 V, 100 W halogen lamp	380079-9040-000

Xenon illumination system

Description	Cat. No.
Complete replacement lamp module with 2 xenon lamps in transport container and with return card; in exchange for a returned module with defective xenon lamps	304977-9036-700
Complete xenon lamp module with 2 xenon lamps (new component)	304977-9036-000

Accessories

Please observe the following:
Only operate the instrument with the accessories included in the delivery package. If you want to use other accessories, make sure that Carl Zeiss or the manufacturer of the accessories has proved and confirmed that these accessories meet the respective technical safety standards and can be used without risk.

Accessory for S7 floor stand

Description	Cat. No.
S7 instrument tray, complete	000000-1352-922

Disposal

**User information
on the disposal of electrical and electronic devices**
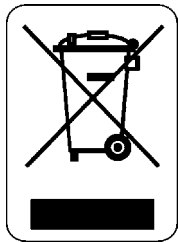
This symbol means that the product must not be disposed of as normal domestic waste.
The correct disposal of electrical or electronic devices helps to protect the environment and to prevent potential hazards to the environment and/or human health which may occur as a result of improper handling of the devices concerned.
For detailed information on the disposal of the product, please contact your local dealer or the device manufacturer or its legal successor. Please also note the manufacturer's topical information on the internet. In the event of resale of the product or its components, the seller is required to inform the buyer that the product must be disposed of in accordance with the applicable national regulations currently in force.

For end customers in the European Union

Please contact your dealer or supplier if you wish to dispose of electrical or electronic devices.

Information on disposal in countries outside the European Union

This symbol is only applicable in the European Union. For the disposal of electrical and electronic devices, please observe the relevant national legislation and other regulations applicable in your country.

Technical data

Technical data

OPMI Sensera surgical microscope

Magnification	Motorized zoom system, zoom ratio 1:6, magnification factor γ = 0.4x - 2.4x.
Total magnification (10x eyepiece)	2.4x - 14.6x at a working distance of 200 mm 1.5x - 8.7x at a working distance of 415 mm
Total magnification (12.5x eyepiece)	3x - 18.2x at a working distance of 200 mm 1.9x - 10.9x at a working distance of 415 mm
Fields of view (10x eyepiece)	14 mm - 84 mm at a working distance of 200 mm 23 mm - 141 mm at a working distance of 415 mm
Fields of view (12.5x eyepiece)	12 mm - 73 mm at a working distance of 200 mm 20 mm - 116 mm at a working distance of 415 mm
Focusing	Continuous motorized focusing via integrated Varioskop Focusing range 200 mm to 415 mm Note: The values shown in the display differ from the actual values. They are rounded values and serve for information only.
Focal lengths f	At a working distance of 200 mm: f = 279 mm, at a working distance of 300 mm: f = 366 mm, at a working distance of 415 mm: f = 467 mm
Illuminated field diameter	At a working distance of 200 mm min. 11 mm - max. 85 mm At a working distance of 415 mm min. 19 mm - max. 142 mm
Tubes / Eyepieces	180° tiltable binocular tube, f = 170 mm 10x or 12.5x widefield eyepieces with magnetic coupling.
Electrical standard	Complying with IEC 60601-1, (power supply using SELV from S7 suspension system)
Weight	approx. 9.2 kg (without tube and eyepieces)

Available as an option

Motorized fine focus	Focusing range ± 10 mm

(Recommended when laser micromanipulators are used.)

S7 floor stand

Mechanical data

Suspension arm	Length: 865 mm Swivel angle: 296° Lifting range: -320 / +400 mm
Carrier arm	Length: 450 mm Swivel angle: 360°
Stand height	1730 mm
Footprint	640 x 640 mm
Admissible max. load on suspension arm	14 kg (complete microscope equipment, including accessories)
Weight of S7 floor stand (incl. microscope)	Approx. 177 kg
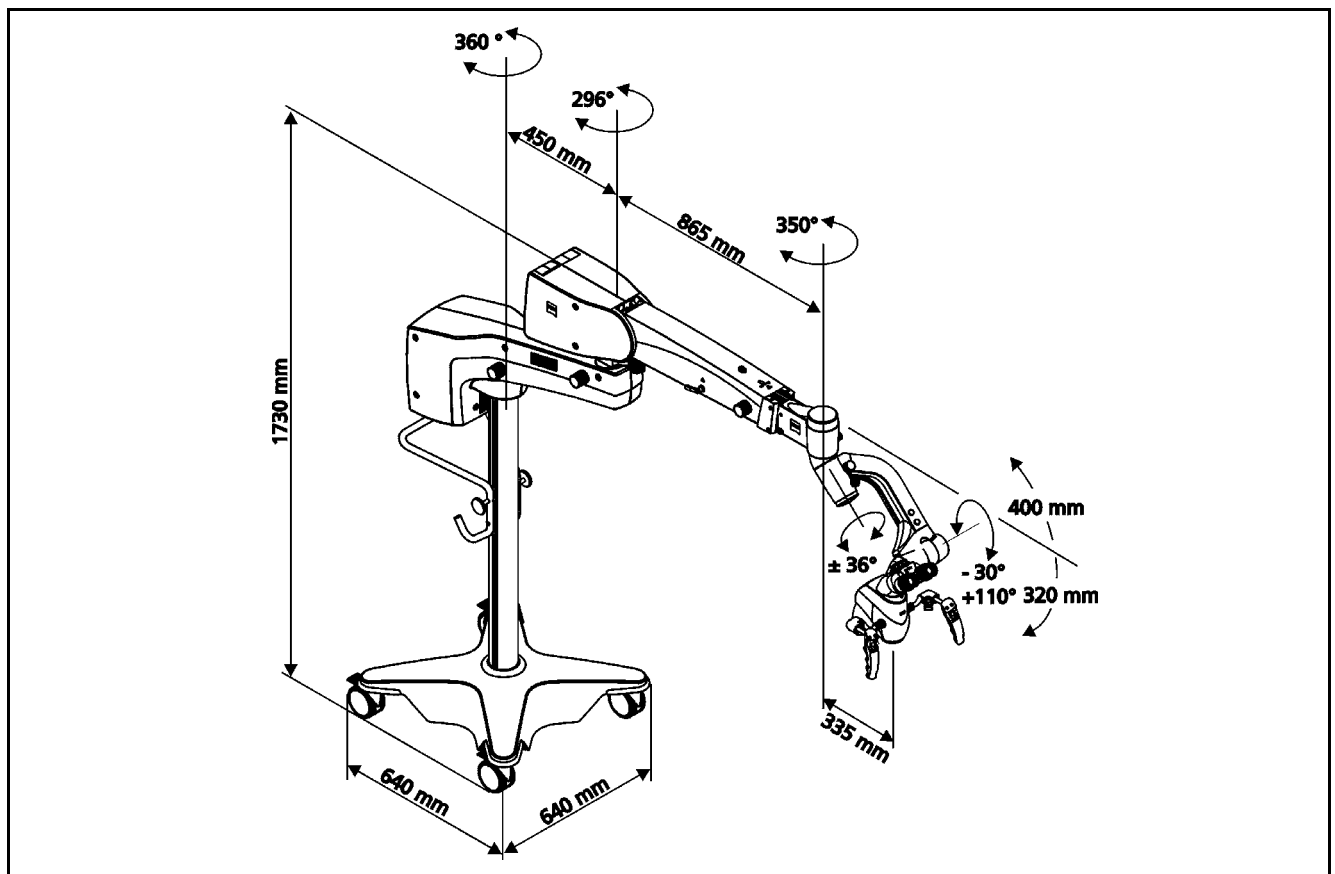
S7 ceiling mount

Mechanical data

Suspension arm	Length: 865 mm Swivel angle: 296° Lifting range: +400mm / -320 mm
Carrier arm	Length: 450 mm Swivel angle: 296°
Admissible max. load on suspension arm	14 kg (complete microscope equipment, including accessories)
Weight of S7 ceiling mount (including microscope)	Approx. 80 kg
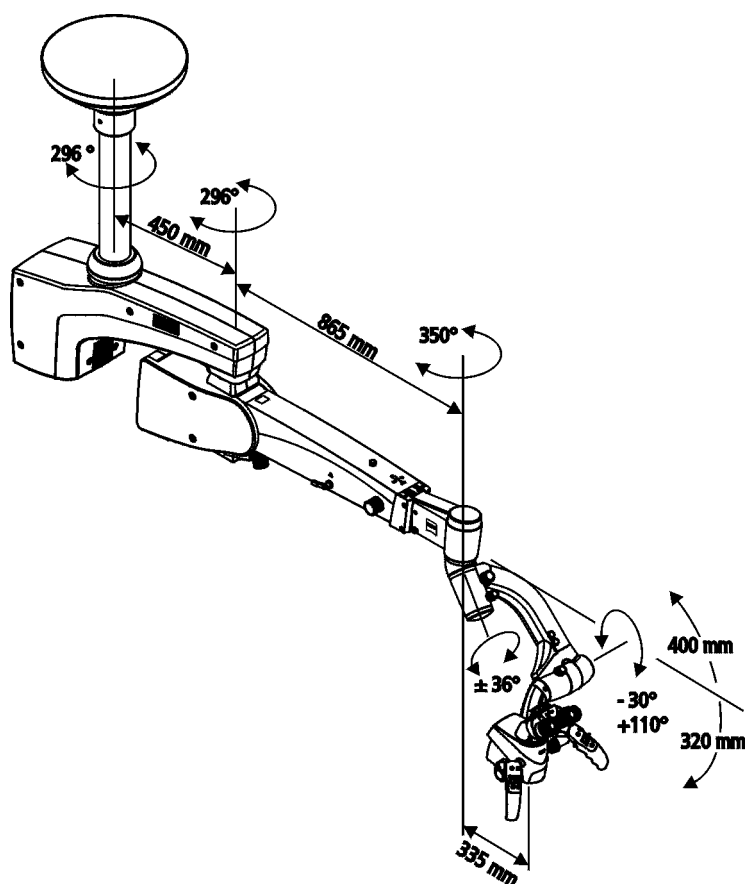
S7 ceiling mount with lifting column

Mechanical data

Suspension arm	Length: 865 mm Swivel angle: 296° Lifting range: -320 mm / +400 mm
Carrier arm	Length: 450 mm Swivel angle: 296°
Admissible max. load on suspension arm	14 kg (complete microscope equipment, including accessories)
Weight of S7 ceiling mount (including microscope)	Approx. 133 kg
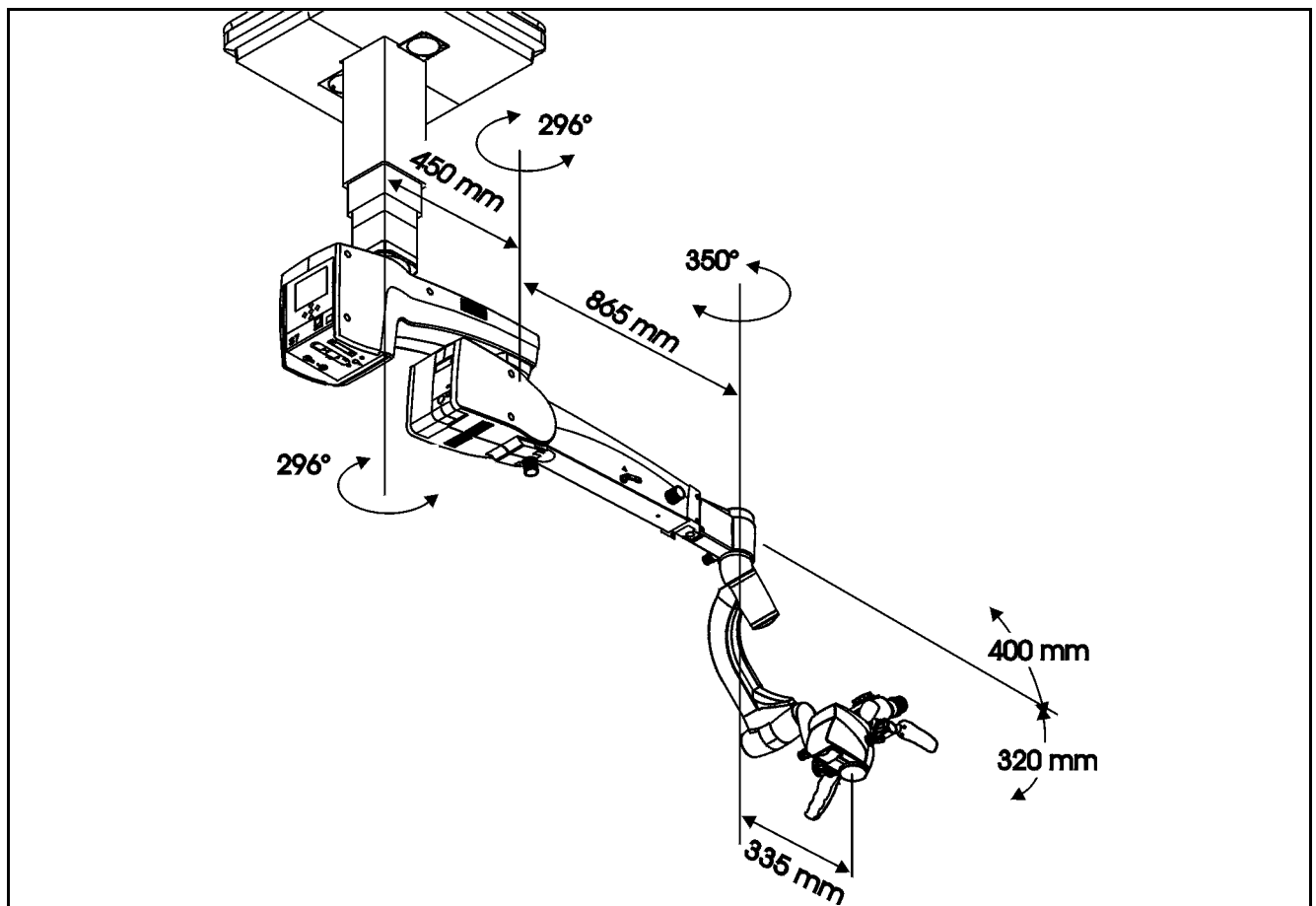
Technical data of lifting column

Rated voltage	24 VDC
Current consumption	5 A
Vertical lift, total	350 mm
Lifting force	2000 N
Lifting speed	5.5 mm/sec
Interval	(operation / pause) 1 min / 9 min

Electrical data (of all S7 suspension systems)

Power connection	Only connect the suspension system to wall outlets which are provided with a properly connected protective ground conductor.
Rated voltage	115 VAC (100...125 VAC± 10 %) 230 VAC (220...240 VAC± 10 %)
Current consumption	115 VAC max. 10 A 230 VAC max. 8 A
Rated frequency	50...60 Hz
Fuses	Automatic circuit breaker
Electrical outlets	– Power outlet 115/230 VAC, max. 5 A (floor stand only) – Surgical microscope – Remote control socket for an external signal of a maximum of 24 V / 0.5 A (floor stand only)
Electrical standard	Complying with IEC 60601-1 / EN 60601-1; UL 60601-1; CAN/CSA-C22.2 No. 601.1 Protection class I, degree of protection IPXO Type B equipment
CE label	The system meets the essential requirements stipulated in Annex I to Directive 93/42/EEC governing medical devices. The system is labeled with C E
Product classification	as per Directive 93/42/EEC, Annex IX: Class I
Approval	
EMC requirements	The system meets the EMC requirements in accordance with IEC 60601-1-2. The system meets the RFI requirements of Class B (practices).

The device has been designed for continuous operation.

Remote control socket
View of connector side

Halogen illumination system

| Fiber optic illumina-tion | 2 halogen reflector lamps 12 V 100 W in quick-change module for light guide, with GG 475 and KK 40 filters.
Fully automatic lamp change. |

Xenon illumination system

| Fiber optic illumina-tion | Xenon short-arc reflector lamp,
color temperature: approx. 5000 K,
rated power: 180 W, rated voltage approx. 14.5 V,
lamp current: 12 A, ignition voltage: 20 kV |
| | Backup lamp in lamp housing, manually se-lectable. |

Integrated 1 CCD PAL video camera (option)

Video focal length	48 mm with 1/4 in. CCD image sensor
Optical separation	80 % observer / 20 % camera
Image sensor	1/4 in. interline transfer CCD image sensor with 752(H) x 582 (V) pixels
Horizontal resolution	480 lines (at 752 pixels)
Signal-to-noise ratio	50 dB (with Y/C signal)
Scan system	2:1 interlace, 625 lines, 50 fields/second, 25 frames/second
Video output ports	VBS: 0.3 V_{p-p}/75 Ω color burst (chrominance) Y/C: 1.0 V_{p-p}/75 Ω luminance, 0.429 V_{p-p}/75 Ω chrominance

Integrated 1 CCD NTSC video camera (option)

Video focal length	48 mm with 1/4 in. CCD image sensor
Optical separation	80 % observer / 20 % camera
Image sensor	1/4 in. interline transfer CCD image sensor with 768(H) x 494 (V) pixels
Horizontal resolution	480 lines (at 768 pixels)
Signal-to-noise ratio	50 dB (with Y/C signal)
Scan system	2:1 interlace, 525 lines, 60 fields/second, 30 frames/second
Video output ports	VBS: 0.286 V_{p-p}/75 Ω color burst (chrominance) Y/C: 1.0 V_{p-p}/75 Ω luminance, 0.429 V_{p-p}/75 Ω chrominance

Ambient requirements

For operation	Temperature Rel. humidity Air pressure	+10 °C...+40 °C 30%...75% 700 hPa...1,060 hPa
For transportation and storage	Temperature Rel. humidity (without condensation) Air pressure	- 40 °C...+70 °C 10%...100% 500 hPa...1,060 hPa

Changes to the system

Subject to changes in design and scope of delivery as a result of ongoing technical development.

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